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AN OUTBREAK OF RABBIT SEPTICÆMIA, WITH OBSERVATIONS ON THE NATURE OF THE DISEASE AND ITS SPECIFIC ORGANISM.

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The Bacillus of Rabbit Septicæmia.

IN the study of the outbreak just described, careful comparative cultures were made from the bacteria obtained from several of the rabbits, and in all cases stained cover-glass preparations from the exudates were carefully examined. There was no difference found in the character of the bacteria, and the evidence was conclusive that the same species of organisms was present in the different animals. The virulence might have differed, but in the germs tested (those from three rabbits in all), this property was identical. In the description of the morphological and biological characters here recorded, a culture from rabbit No. 500 was used.

Morphology.—A non-motile bacillus with ends rounded. In stained cover-glass preparations made from the exudate of the dead rabbits, it appeared as an elongated oval germ, with more or less polar arrangement of the protoplasm. It varied in size from 1·2 to 1·8 μ in length, and from μ 0·8 to 1·0 μ in width. There were frequently many involution forms which were especially interesting from the fact that the cellular substance appeared to be concentrated at one end of the elongated form, which frequently assumed a sack-like appearance. These were especially observable in preparations from rabbits, that were not examined until ten hours after death.

In cultures they were slightly smaller. They stain readily with the ordinary aniline dyes, but do not retain the colouring matter when treated by the Gram or Weigert-Gram methods.

Biology.—On agar it developed a grayish, viscid growth. It did not grow on potato or in gelatine. It produced no appreciable change in milk. It imparted a uniform cloudiness to alkaline *bouillon*, and changed its reaction in twenty-four hours to a strongly acid one. After several days standing, a thin, grayish band was deposited on the sides of the tube, at the surface of the liquid, and a grayish, viscid sediment collected in the bottom of the tube. It did not develop in acid *bouillon*. In the fermentation tube, containing *bouillon* plus two per cent. glucose, it imparted a cloudy appearance throughout the liquid. It fermented glucose, but did not produce gas.

Very marked indol and phenol reactions were obtained with a culture that had grown for eighteen days. Its thermal death point, power to resist drying, and to survive in sterilized water were determined. An exposure in a water bath for five minutes, at a temperature of 58° C, destroyed its vitality. Upon cover-glasses exposed to the atmosphere under a bell jar, it lost its power of development when inoculated into *bouillon* in forty-eight hours. It perished in sterilized distilled water in eleven days.

It will be observed that, morphologically and biologically, this bacillus does not differ appreciably from the swine-plague germ, except, perhaps, in its indol reaction, which I have never found in similar cultures of swine-plague bacteria. It was found by Dr. Smith in one case.

Pathogenesis.—Mice, pigeons and guinea-pigs remained well after an inoculation with from 0·1-0·2 cc. of a fresh *bouillon* culture. Rabbits inoculated subcutaneously with a similar quantity of the virus, developed quite severe local abscesses, but finally recovered. A rabbit inoculated intravenously with 0·4 cc. of a fresh (twenty-four hour) *bouillon* culture, perished on the fifth day with exudative pleuritis, pericarditis and peritonitis. A second rabbit inoculated with a similar quantity of the culture, died on the sixth day. It exhibited a cellular exudate over both parietal and pulmonary pleura. The dorso-median portion of the principal lobes of both lungs were in a state of red hepatization, the cephalic lobes were collapsed; the heart muscle was pale, and contained dark blood clots; mucosa of trachea injected; liver pale, fatty; spleen enlarged, dark and friable; kidneys hyperæmic; in the intermuscular tissue about left knee and

right elbow joints were small abscesses, containing pus and rabbit septicæmia bacteria. Stained cover-glass preparations from the various organs contained very few bacteria. Those from the exudate and pus from abscesses exhibited an innumerable number of polar stained germs.

A short series of inoculations were made for the purpose of accelerating the virulence of this bacillus. The results were negative.

A rabbit inoculated in the ear-vein with 0·6 cc. of a pure culture died in about forty-four hours, and its organs contained innumerable bacteria which exhibited a marked polar stain in carefully prepared preparations. A second rabbit inoculated with 1·0 cc. died of septicæmia in twenty-four hours. In large doses, therefore, it produced a rapidly fatal septicæmia. In these cases the disease could not be distinguished, either by the lesions or the number and appearance of the bacteria in stained cover-glass preparations from the organs, from the disease produced in rabbits with a small quantity of virulent swine-plague bacteria.

The organism obtained in this epizootic of rabbit septicæmia has been found, by a comparative study, to differ from the swine-plague germ in its excessive attenuation, the marked indol reaction, and in certain morphological characters, which, however, are more rarely observed in the involution forms of the virulent swine-plague germ. The outbreak is further illustrative of the extent of the distribution and manifestation of this group of bacteria. Although the source of the germ has not yet been determined, the fact of its producing a local disturbance in the nares, and, subsequently, in many cases, pleuritis and pneumonia, is of considerable importance, not only in its relation to rabbit septicæmia, but also in the suggestions which it offers concerning the etiology of certain forms of pneumonia in other animals, as well as in the human species.

Rhinitis in Rabbits, and its relation to Rabbit Septicæmia.

From the preceding pages it will be observed that rhinitis in rabbits has been somewhat common, and that in this outbreak of rabbit septicæmia the nasal trouble preceded the fatal localization of the disease. This association of the two affections led to an investigation of the rhinitis. In some instances the nasal trouble was very slight, while in others there was a more profuse discharge, accompanied with difficulty in breathing. Upon examination the nasal mucosa was found to be whitish (opaque), thickened, and covered with more or less muco-pus. The examination of stained cover-glass

preparations from the nasal discharge showed bacteria, which resembled those of rabbit septicæmia, in greater or less numbers. They were much more numerous in preparations made from scraped mucosa, than in those from the secretions. The presence of these bacteria was expected in cases in which the lung disease was advanced, but usually in those cases the nasal symptoms were less marked. Their appearance in the nasal cavities of rabbits suffering from the rhinitis, only indicated a causal relation existing between these bacteria and the rhinitis. The temperature of the rabbits suffering from rhinitis was normal, but when the lungs or pleura became affected the temperature was elevated. In order to trace the course of the disease, several of the rabbits that were suffering from rhinitis were killed and examined. This demonstrated the fact that the rhinitis was usually the starting point of the disease.

Rabbits with Rhinitis that were killed for Examinations.

Rabbit No.	Rhinitis Appeared.	Rabbit removed from Pen.	Rabbit Killed.	Suffered from Rhinitis.	Lesions.
26	May 8,'93	I	June 8	30 days	Rhinitis. Trachea hyperæmic, dependent portion of cephalic lobe of right lung hepatized, rabbit septicæmia bacteria.
28	May 8,'93	E	June 3	25 days	Severe rhinitis. Lungs normal, rabbit septicæmia bacteria from nasal secretions.*
39	May 8,'93	R	Jun. 22	45 days	Rhinitis. Lungs normal, rabbit septicæmia bacteria from nasal mucosa † scrapings.
27	May 9,'93	YY	June 7	29 days	Rhinitis. Right lung collapsed, pleura covered with cellular exudate, rabbit septicæmia bacteria.
55	Jun. 22,'93	FF	Jun. 28	6 days	Severe rhinitis, lungs normal, rabbit septicæmia bacteria.

* Rabbit septicæmia bacteria isolated from impure liquid cultures by means of agar plates.

† A rabbit inoculated with the cultures obtained from the nasal mucosa perished of rabbit septicæmia. Pure cultures were obtained from its organs, and in cover-glass preparations from the same the polar stained bacteria were found in large numbers.

A more detailed description of the lesions that were found in the different rabbits is appended.

Rabbit No. 26.—In fairly good condition. The nasal cavities contained a considerable quantity of muco-pus. Mucosa thickened, pale. The mucosa of the larynx and

upper trachea hyperæmic. In the dependent portion of the cephalic lobe of the right lung, a small area of hepatization. Bronchioles in hepatized portions filled with muco-pus. The secretions from the nasal cavities, tracheal mucosa and bronchioles, contained rabbit septicæmia bacteria, as indicated by stained cover-glass preparations.

Rabbit No. 28.—Female, pregnant. The nasal cavities contained very much muco-purulent substance. Mucosa thickened, deeply reddened. Lungs normal, heart muscle pale, liver fatty, *bouillon* tubes inoculated from the blood and liver remained clear. One inoculated from the nasal discharge developed an impure culture of rabbit septicæmia bacteria, which were isolated by means of agar plate cultures.

Rabbit No. 39.—In good condition, considerable abdominal fat. The abdominal and thoracic organs appeared to be normal. The mucosa of the nasal cavities thickened, opaque, and covered with a muco-purulent substance. Stained cover-glass preparations from the nasal secretions exhibited very few bacteria, but those made from scrapings of the mucosa showed many polar stained rabbit septicæmia bacteria. A tube of *bouillon* inoculated with the scrapings from the base of the mucosa, developed apparently a pure culture of the bacillus of rabbit septicæmia. A rabbit inoculated intravenously with 0·75 cc., died in about thirty-six hours. Innumerable polar stained bacteria were present in cover-glass preparations from the liver, spleen, and blood. Pure cultures were obtained from the blood and spleen.

Rabbit No. 27.—Was somewhat emaciated. The nasal cavities were empty. Mucosa not appreciably affected. Tracheal mucosa deeply reddened, due to the injection of blood vessels. The left lung and heart were normal; the right lung collapsed and encased in a thick layer of grayish, partially organized cellular exudate. Liver hyperæmic. Spleen slightly enlarged. Kidneys firm, pale. A small quantity of thick, very cloudy alkaline urine. Microscopical examination of sediment showed the presence of a few granular casts. Stained cover-glass preparations from the pus enclosing the lung, revealed innumerable rabbit septicæmia bacteria. Cover-glass preparations from the nasal mucosa exhibited rabbit septicæmia bacteria.

Rabbit No. 55.—Not emaciated. The abdominal and thoracic organs appeared to be perfectly normal. The mucosa of the trachea and larynx were slightly reddened, due to the injection of blood vessels. Pharynx apparently normal. The nasal cavities contained a considerable quantity of grayish

purulent substance. The mucosa of the nares thickened and whitish. Very few bacteria were found in the cover-glass preparations from the discharge, but in those made from scrapings of the mucosa there was a moderate number of oval polar stained bacteria. A tube of *bouillon* was inoculated from the scrapings at the base of the mucosa; this developed apparently a pure culture of rabbit septicæmia bacteria. Agar plate cultures were made from the *bouillon* culture. Only colonies of rabbit septicæmia bacteria developed.

The number of rabbits killed for examination was sufficient to show the cause of the nasal difficulty. The attenuated condition of the bacteria accounts for their long residence in the nasal cavities without injury to the rabbits, other than the rhinitis. In rabbit No. 15, the left ovary and terminus of fallopian tube were encased in a pus sac. The chronic nature of the disease can be appreciated by the fact that several of the rabbits (Nos. 11, 12, 15, 19, 20, and 29) were known to have suffered from the rhinitis from ten to twenty days prior to their death. These were first observed to be affected and were removed from the breeding-pens, together with about ten others, May 8th. Since that time a few other rabbits have been affected and removed.

In the latter part of July the surviving rabbits were killed for other purposes. They exhibited no lesions except a thickening of the nasal mucosa. About one-half of the rabbits that were affected with the rhinitis in the breeding-pens died. The cause of death was due to pleuritis, pneumonia or peritonitis. None of the breeding rabbits recovered, although the nasal symptoms improved in some instances. Among the stock rabbits a smaller per cent. of deaths occurred, and a few apparently recovered. The disease, however, is of considerable importance, since rabbits, especially adults, once affected with it can never be considered safe for some kinds of experimental work.

Two experiments were made to test the communicability of the rhinitis from one rabbit to another. June 3, two young rabbits (Nos. 29 and 30) were placed in a pen with an adult rabbit that was suffering from rhinitis. July 12, No. 29 showed symptoms of rhinitis, and on July 14th No. 30 was affected. July 20th, there was a profuse nasal discharge, with accompanying difficulty in breathing. Temperature normal. July 26th, rabbit No. 30 was killed for examination. No lesions were discovered, except a thickening of the nasal mucosa, with a profuse muco-purulent discharge from the nasal cavities; cover-glass preparation from the mucosa

exhibited polar stained bacteria. A second exposure was made with an adult (old) rabbit. This gave negative results. The affected rabbits that were used in the experiments continued to suffer from rhinitis.

The length of time that elapsed after the exposure before the young rabbits developed symptoms of the nasal trouble, and the failure of the adult rabbit to contract the disease after a two months' exposure, would indicate that it is not a rapidly contagious disease.

The source of the germ is of much interest and importance. A careful bacteriological examination of the material used for bedding and food for the rabbits gave negative results. A considerable number of healthy rabbits have been examined, but thus far the germ has not been found in the normal flora of their upper air passages, although bacteria not distinguishable from it in their biological properties have been found in the upper air passages of many of our domesticated animals. In an unpublished article* by one of us (V.A.M.) on "The pathogenic and toxicogenic bacteria in the upper air passages of domestic animals," attention is called to a few attenuated bacteria that were found in the air passages of certain healthy animals, which resembled the swine-plague group in their biological characters. Although the evidence is not at hand to establish the fact, our knowledge of the variations that exist in the virulence of the various members of the group of bacteria to which the bacillus of rabbit septicæmia belongs, indicates the possibility of the existence of saprophytic bacteria which, when taken into the nasal cavities might, under as yet unknown conditions, become more parasitic in their nature, and eventually produce the rhinitis and its sequela. In septicæmia caused by wound infection, we find a somewhat analogous condition; for many of those cases have not been traced to an infection by specific bacteria that are capable of living as parasitic organisms only. In fact, some cases have occurred where an infection with germs that have not lived in a condition that would destroy the known species of bacteria that produce septicæmia, seems impossible. Again, the experiments of Koch and Gaffky with rabbit septicæmia would indicate the possibility of the existence of these bacteria under certain conditions in nature, outside of the animal body.—*American Veterinary Review.*

* Bulletin No. 3. Bureau of Animal Industry, Department of Agriculture, Washington, D. C.

A CONTRIBUTION TO THE STUDY OF DISEASES OF THE NERVOUS SYSTEM.

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(*Continued from page* 79.)

CEREBRO-SPINAL MENINGITIS AND CERTAIN POISONINGS IN CATTLE.

NUMEROUS cases of nervous disturbance in cattle, of an enzootic character and designated cerebro-spinal or spinal meningitis, have been reported and compared, even identified by some writers, with the disease of that name affecting the human species.* It is true that in these reports the nosographical tableau presents some marked differences, for in the majority of the cases the symptoms of depression predominate, while in the others the affection is characterised by a state of nervous excitement, as will be noted in the following summary of the symptoms:—

Symptoms.—It is stated that the malady is generally denoted at first by a certain difficulty in mastication and deglutition, producing an apparently abundant salivation, as the saliva flows from the mouth. The appetite being unimpaired, the bolus of food remains in the mouth, owing to swallowing being difficult or impossible. After the second day, paralysis of the tongue, pharynx and œsophagus is complete; defecation is retarded, and the fæces are hard and dry; there is no fever and the temperature is normal, but the pulse is feeble, and the beats are from 44 to 48 per minute. The mucous membranes are pale, the extremities cold, and there is a certain diminution in sensitiveness which may go on to complete anæsthesia. The animals are frequently lying down, and when compelled to get up they stumble on all their limbs; others are totally paralysed and incapable of rising, and in this condition the decubitus has some analogy to that of animals affected with parturient apoplexy. Death occurs without any agony in from three to five days. In other instances there are noted, at the first period, symptoms of *excitement*, indicated by disordered movements, with spasm of the neck muscles (opisthotonos), trismus, bellowing, rolling of the eyes; at other times, the clonic spasms extend to the muscles of the head and

* Lecouturier, "Annales de Méd. Veterinaire," 1869 and 1872. Vogel, Utz, Mayer, Anacker, Jost, etc., "Repertorium," 1869; "Gurlt's Magazin," 1867. Schmidt, "Naturforscher Versammlung," 1886. Mehrdorf, "Berliner Archiv," 1891. Harms, "Deutsche Zeitschrift für Thiermedecin," 1887.

shoulders, and even to the limbs. But soon the stage of excitement passes away (it may continue from twelve to twenty-four hours), and is succeeded by a state of coma and symptoms of general paralysis.

Generally the cause cannot be ascertained, though in some instances miasmatic influences, and sometimes even cold, have been accused of operating in the production of the disease.

With regard to lesions, Vogel gives the following:—Blood rare, fluid, and not coagulated; flesh highly coloured, as if it had been cooked; rumen slightly inflamed; serum turbid and reddish tinted in the spinal canal and cranial cavity; pia mater and arachnoid showing signs of inflammation, and nearly always for a limited space (first and fifth cervical vertebræ).

Poisonings.

As analogues to these disturbances, the cause of which has not been determined, it is well to cite some cases of poisoning, at first by fungi, and afterwards by toxical agents (ptomaines), which are formed in forage under certain conditions.

(*a.*) *Poisoning by Moulds.*

Kammerer* states that seven cows, after eating mouldy hay, showed profuse salivation, injection of the mucous membranes of the head, cerebral excitement, and even fits of epileptiform convulsions. This period of excitement was followed by a comatose condition.

Zipperlen† observed in five cattle paralytic symptoms—asphagia, pendent tongue; feeble pulse, respiration normal, and total inability to rise. Professor Vogel identified the disease with spasm of the neck in man, and attributed it to infectious causes (?); but Zipperlen attached etiological importance to mouldy clover, which had been given the animals to eat.

Martin‡ gives the case of seven paralysed cows, but which had no dysphagia, this condition ensuing after they had been fed on malt covered with a greenish-gray mould, and which had been prepared with tepid water.

Marquard§ was called in to treat four cows, which were so paralysed that they were unable to raise the head; the symptoms set in after they had consumed beet-root covered with mould.

* "Bad. Mittheilungen," 1871. † "Repertorium," 1877.
‡ "Wochenschrift für Thierheilkunde," 1890. § "Thierarztlichen Mittheilungen," 1892.

(*b.*) *Poisoning by Ustilagines and Uredines.*

As a rule, lesions of the intestinal mucous membrane predominate in intoxications produced by the *Ustilagines*, though sometimes the nervous symptoms are more accentuated, and in such cases there is paralysis of the tongue and pharynx, an abundant salivation, and continual masticatory movements. Psychical disturbances are generally not apparent, even when the muscular weakness is so great that it approaches complete paralysis, and the animals remain constantly recumbent.

Adam, Koch, Herele, etc.* observed cases of intoxication in cattle caused by the *Tilletia caries*, and Koch† and Rost‡ have witnessed a similar occurrence. Köpke§ saw, after the use of *Poa aquatica*, which was infested with *Ustilago longissima*, dysphagia, staggering progression, and rapidly ensuing paralysis.

The *Uredines* more especially attack the nervous system. The *rust* of grain at times causes real epizootics among the cattle of certain countries, the character of which has probably not always been recognised, and which have then been attributed to the influence of non-demonstrated infecting agents. The observations made in Holland with regard to this subject are most interesting, and merit notice *in extenso*, or at least as much allusion as may be compatible in this essay.

In the provinces of Utrecht and South Holland, and especially on the banks of the Old Rhine, there frequently prevails in autumn an epizootic disease, known to the farmers by different designations. Poels and Lameris were the first to demonstrate that the poisoning was caused by fungi, and they made a careful study of the malady and its anatomical lesions.¶

In consequence of the great drought which occurred in the spring of this year, this disease made serious ravages in the above-named countries, so that we were enabled to observe some cases in the month of June, and the symptoms noted concorded perfectly with those enumerated by the authorities just mentioned.

Symptoms.—There is reason to distinguish three forms of the disorder, with respect to its duration. It may assume the *fulminating*, the *acute*, or the *subacute* type.

* Adam's "Wochenschrift," 1876 and 1878. † "Repertorium," 1882.
‡ "Sachs Bericht," 1890. § "Preuss-Mittheilungen," 1877.
¶ "Verslag aan den Koning," enz., 1889.

In the fulminating or apoplectic form, the animals are seized all at once with clonic and tonic spasms, and succumb in a few minutes; so that it happens that the owner often finds one of his cattle lying dead on the pasture without his having perceived it was ill.

In the second as well as in the third form, there may be distinguished a period of *excitement* at the commencement, followed by a second period of *depression.* The malady is denoted by psychical, motor and sensorial disturbances.

The animals are continually in movement and keep the legs apart, carrying the head high because of the tonic spasms in the muscles of the neck; the eyes are staring and glistening and the pupils dilated; and there are also clonic spasms of the muscles of the head, as well as excitement of the generative organs. In addition to these symptoms, there is great excitability and more particularly hyperæsthesia of the skin; so that on the slightest touch the spasms of the neck are exaggerated, and the respirations and pulse are increased in frequency. Attempts to administer medicaments to the patient often give rise to convulsive epileptiform attacks, in the course of which the animal may succumb. Tonic spasms in the masseter muscles and in those of the neck and anterior limbs are not rare, as well as continuous masticatory movements and grinding of the teeth. The temperature ranges between 38·5° and 40° Cent., and the pulse rises to 120—130 beats per minute, the contractions of the heart being often tumultuous and irregular. Micturition is frequent, though sometimes there is observed a kind of strangury, as well as retardation in expulsion of the fæces.

If the animals do not succumb during this period of excitement, there soon ensues psychical depression and motor paralysis. They generally remain standing, indolent and soporific, completely motionless, jerking the head from time to time, and grinding of the teeth can be heard. They are difficult to move and then they stagger in their gait; not unfrequently standing is impossible. Total blindness is a constant complication; the tongue is paralysed to such a degree that it hangs out of the mouth, or if drawn therefrom the animal can only retract it with difficulty; a filamentous saliva escapes from the oral aperture. The appetite is entirely suppressed, and the flow of milk ceases.

But even in this depression stage attacks of vertigo may be manifested from time to time. The complications of the intestinal mucous membrane sometimes reach such a pitch that there is not only a profuse diarrhœa, but this may even

be sanguinolent. The tint of the mucous membranes of the head is livid or cyanosed.

In the second form the malady exists for from some hours to two days—though it may last for eight; the animals generally die, recovery being rare.

Lesions.—The alterations in the nervous system will first be noticed.

Beneath the dura mater and in the subarachnoid spaces there is a large quantity of serous fluid which is sometimes of a hæmorrhagic character. The vessels of the pia mater are strongly injected, and this membrane even presents ecchymosed patches, especially on the inferior surface of the spinal portion, on the pons Varolii and the crura cerebri. Extravasations of blood are sometimes met with beneath the arachnoid.

Nothing abnormal is usually noted in the substance of the cerebrum, but on rare occasions small hæmorrhagic points are found in the cortical portion, or there is a serous infiltration that has caused a certain degree of softening of the brain tissue. The ventricles contain a notable quantity of serum which is at times sanguinolent.

The meninges of the spinal cord, and particularly the pia mater, show the lesions of an intense congestion. The mucous membrane of the fourth compartment of the stomach and the small intestine manifest traces of catarrh. It is covered with a thick layer of mucus, in which we have found small brown elongated corpuscles, visible to the unaided eye, and they were in such quantity as to give a brownish colour to the mucous membrane; this colour disappears when the secretion has been removed. We consider these rods as pigment of hæmatogenous origin. In some cases there is hæmorrhagic enteritis, especially of the cœcum and colon.

Pathogenesis.—A bacteriological examination gives negative results. In 1889, Poels and Lameris made a minute examination of the intestinal contents of thirty animals, and they discovered that the herbage which these had consumed had been soiled with fungi, particularly with *teleutospores* of the *Puccinia coronata* and *P. graminis*. The spores of certain Ustilagines—among others the *Tilletia caries* and *Urocystis occulta*—were only found in a minimum quantity.

Frequently the blades of the herbage which, on a macroscopical examination, did not show any spores externally, exhibited them in a very distinct manner when submitted to a microscopical examination. The hyphæ in mass had penetrated the parenchyma of the plants.

It was on the banks of ditches, and on the places where cow dung had been deposited, that the herbage was discovered to be most affected in this way.

The frequency of cases of poisoning this year during the month of June, is explained by the fact of the great scarcity of forage that occurred, which compelled the animals to devour even the roots of the old herbage which was infested by the hybernating spores of last year.

So long ago as 1866, Franck, of Munich,* made experiments on three rabbits with the *Puccinia graminis*. In the month of June he gave these animals the leaves of *Elymus Europæus*, which were covered with uredospores. Between the third and fourth day subsequently, the animals became unwell; they were dull, their back was arched, they would remain for some minutes in a state of opisthotonos, with dilated pupils and the breathing slow and deep, while the heart-beats were feeble and the temperature subnormal. Death took place in three hours. The heart had stopped in diastole, and the intestinal tube was perfectly intact.

Kopke† describes the poisoning of eighty cows by the *Puccinia arundinacea*. Twelve of the animals perished in an hour-and-a-half with symptoms of paralysis.

Friebel‡ relates the poisoning of five cattle by hay infested with the *Puccinia arundinacea*, and gives the symptoms as muscular weakness, paralysis, hæmaturia and fever.

Wankmüller§ mentions the intoxication of four cows after eating forage soiled by Uredines; the symptoms were: a profuse salivation, paralysis of the tongue, coma, dilatation of the pupil, feeble pulse and colics. Death occurred in fifteen to eighteen hours.

Other Poisonings of Bovines by Altered Forage.

Here we have to deal with intoxications *en masse* which were manifested exclusively by nervous disturbances.

(1.) *Intoxication by Pulp from Sugar Manufactories.*

Although we have practised for a number of years in a locality where there were large establishments and farms, the animals in which were fed on large quantities of pulp, we have had occasion to observe only one mishap from its use.

In the spring of 1871,¶ a sugar manufacturer requested our services for two young stirks which, according to the servant, had been losing condition for some time. The cattle, which

* "Wochenschrift für Thierheilkunde und Viehzucht," 1886.
† "Preuss. Mittheilungen," 1878, 1885. ‡ Ibid, 1881.
§ "Adams' Wochenschrift," 1884. ¶ "Verslag aan den Koningenz.," 1873.

were put up to fatten, consumed on the average about forty-four lbs. of pulp per head, given three times a day with linseed cake. The pulp was preserved in silos, which consisted merely of pits dug in the ground.

The animals did not exhibit any symptom which would lead to the supposition that there was a lesion in any organ, if it was not a slight gastro-intestinal catarrh. Three weeks later nervous symptoms appeared, in the form of epileptiform seizures which were repeated four times a day. The slightest excitement produced a fit, which lasted about five minutes. In about eight days paralytic symptoms showed themselves; the animals stumbled in walking, and there was a progressive cerebral depression until at length standing became impossible. Complete anorexia, accompanied by a profuse diarrhœa, were added to the nosological list. The owner decided to have the animals killed.

Soon after, two bullocks, aged three and five years, showed the same symptoms. Supposing the cause to be due to altered pulp (?), the proprietor resolved, at my suggestion, to dispense with it altogether; this stopped the course of the malady.

It is probable that, under influences which then were unknown to me, ptomaines were formed, and they gave rise to an intoxication which ran a chronic course, different to the chronic form described by Cordier of Soissons, and others. The owner admitted that the pulp was mouldy.

At the autopsy we found only a simple catarrh of the true stomach and small intestine.

(2.) *Poisoning by Maize Meal.*

In the course of January, 1886, Veterinary-Surgeon Van Leeuwen consulted us upon the following case:—In an establishment in the environs of Leyden, twenty-seven out of thirty cattle were suddenly seized with illness. On January 11th, the proprietors had bought a quantity of maize meal from La Plata, of which each cow received nearly eighteen pounds daily. The meal was mixed with water the evening before it was given to the cattle. On the 13th and 14th three animals succumbed. All the patients were in a state of deep somnolescence, lay continually, and refused all food. Some cows were constipated, but the majority had a profuse diarrhœa, and two had even vomited. Amaurosis was a constant complication in all.

Three cows which had just calved were not affected.

The owner, suspecting the newly-purchased meal, sent a

sample to a chemist for analysis, as he imagined there was a mineral poison in it. But so far as a poison of this kind was concerned, the examination was negative.

On the 15th all the animals were down, some in the sternal position, others in lateral decubitus, and all completely immovable; sensibility was blunted in a high degree. In compelling them to get up, which was not always successful, it was remarked that the hind quarters were raised more readily than the forehand. The animals could scarcely bring the fore limbs under them, in consequence of a tonic spasm of the extensor muscles; once on their feet they staggered and stumbled, then lay down immediately. The other symptoms observed were: Normal temperature, pulse frequent and small, respiration normal and superficial in the majority of the animals, and micturition seldom.

It was not until the 19th that the cattle recovered from their comatose condition. In some of them vision was still imperfect; and others yet had rigidity of the anterior limbs. Nearly all took nourishment with avidity, but deglutition was performed with much difficulty.

A simple physical examination, as well as a microscopical investigation, did not discover the presence of any foreign substance or any alteration in the meal. When the latter was administered in milk to a dog for three days, it did not cause any disturbance to the animal.

An obliging neighbour demonstrated the toxical properties of the meal while attempting to prove its innocuousness. He gave it to three of his pigs, and in three days two of them were lying and refused all food. When forced to rise they showed the characteristic symptoms of chorea, and when the owner saw them lying about he determined to stop the experiment, convinced by the results of the poisonous properties of the meal.

(To be continued.)

NOTES ON SOME DISEASES IN STOCK IN QUEENSLAND.

BY THOMAS L. BANCROFT, M.B., EDIN.

WHILST engaged in investigations into the nature of the Birdsville horse disease and some other diseases affecting stock, I made a few observations which I wish to place on record.

Almost every horse dissected on the Diamantina and in Brisbane was found to have the Maw-worm disease. The

worms, which have received the name *Spiroptera megastoma*, are very small, but are present in countless numbers, and occasion growths or tumours situated between the mucous and muscular coats of the stomach. The growths are frequently as large as a man's fist, and there may be one or more of them; they probably do some harm, although apparently they do not.

In Brisbane every horse examined was affected to some extent with the lung-worm, *Strongylus micrurus*. These worms are from one to three inches in length; they occasion bronchitis and pneumonia. I did not encounter them on the Diamantina. The same worm I have seen also in the lungs of sheep.

In Brisbane I found one horse with the worm-aneurism disease so common in horses in England. The mesenteric arteries were those affected. Attached to the inside walls of the aneurisms were the worms known as *Strongylus armatus*.

I examined several yearling horses, which were dying at Deception Bay of an unknown disease. They were emaciated, hung their heads, and had swollen lips. I was able to find the cause, which is the large worm called *Ascaris megalocephala*. Certain parts of the intestine were distended with these worms. All the worms present in one case were collected; they filled a quart jar.

Horses in Brisbane are particularly badly infested with worm parasites; besides the above kinds I have found *Oxyuris curvula*—a tape-worm, probably *Tænia plicata*—and several kinds of *Strongylus*, the names of which I have not been able to ascertain.

In sheep, besides the *Strongylus micrurus* of the lungs and the intestinal nodular disease, I have examined the affection known as cancer, common on the face; it is certainly a true cancer or carcinoma.

Oxen on the Diamantina were found to be free from worm parasites. I observed there some cattle affected with tuberculosis, some with pleuro-pneumonia, and one with actinomycosis of the upper jaw; in the Port Curtis district I observed a few with tuberculosis, and one with actinomycosis of the jaw.

In Brisbane, at Dunwich and Deception Bay, and in the Port Curtis district, cattle are more or less infested by two worms, viz.:—The *Amphistoma conicum*, a small fluke generally found in large numbers congregated in the honeycomb stomach; they appear to be harmless. The *Œsophagostoma columbianum* is a small worm, which sets up a nodular or tubercular condition of the intestines, mesentery and omentum.

I succeeded in finding the embryo worms in the nodules on the omentum, although I had previously searched unsuccessfully for them in the intestinal nodules both of oxen and sheep. In oxen and sheep this disease is not restricted to the large intestine, as has been often stated; a good description of the disease is given in Dr. Curtice's work, "The Animal Parasites of Sheep."

There were present in several oxen in Brisbane and Rockhampton the worm tubercles first noticed by Dr. Morris, of Sydney (Royal Society, New South Wales, vol. xlv., p. 337), and since by my father and others. It seems impossible to extract from these growths worms sufficiently unmutilated to serve for description. Judging from the small pieces, this worm appears too coarse in structure to be a Filaria, and probably belongs to the genus Strongylus.

The Birdsville horse disease is an epizootic pneumonia, probably of bacterial origin. The chief symptoms are asthma and slight dragging of the hind toes.

Rickets of oxen is a spinal cord disease. The chief symptom is loss of co-ordination of movement of the hind limbs. There are only slight changes to be seen in the spinal cord. Cattle probably get in this condition through eating the Zamia, which is very indigestible.

I have seen cases of symptomatic anthrax in calves for a number of years past at Burpengary; this disease generally shows there every spring, but does comparatively little damage. Two or three calves take the disease and die, after which no further cases occur.

At Rockhampton I saw several horses that had what is termed "swamp-cancer." I had the privilege allowed me to remove a tumour of the fetlock, said to be a swamp-cancer. This, when examined microscopically, proved not to be a carcinoma; it is probably a sarcoma.

The disease in oxen known as cancer, often seen on the backs of old cows, is a carcinoma

From Mr. Irving, M.R.C.V.S., some years ago, I received two growths which he had removed from the eye and conjunctiva of a horse and a cow. He called them cancers, and microscopic examination proved that he was right.

In steers there is sometimes a tumour of the scrotum. This, according to Professor Hamilton, who examined it for me, is a Lymphangioma allied to that in man.

In dogs I have noticed several tumours. Two were found to be Carcinomata: one was situated on the skin of the abdomen, the other on the penis. Another tumour that grew very

rapidly from the thigh had the appearance of a melanotic sarcoma; but Professor Hamilton, who kindly examined it, says that it is a cartilaginous tumour of rapid growth.

THE MALARIAL CATARRHAL FEVER OF SHEEP IN SOUTH AFRICA.

BY D. HUTCHEON, M.R.C.V.S., COLONIAL VETERINARY SURGEON, CAPE OF GOOD HOPE.

CATTLE are not ordinarily subject to the special form of catarrhal fever which affects sheep in this Colony over such a large area during the summer and autumn months, but it is quite possible that individual cases of acute catarrh may occur in cattle under conditions similar to those which give rise to the disease in sheep. I may remark, however, that cattle are subject to acute catarrhal inflammation of the mucous membrane which lines the upper air passages, called malignant catarrh, in countries in which the malarial catarrhal fever of sheep does not occur, so that a case referred to by Mr. Frost may have no direct relation to the similar special disease of sheep, but is merely an acute form of catarrhal inflammation, due to cold or sudden some change in the atmosphere.

Sheep often suffer from acute catarrh, or a severe cold, with a profuse discharge from the nostrils during the winter months, due to exposure, sudden change in the atmosphere, or from being placed in a low ill-ventilated shade during severe weather. But such colds or catarrhs are perfectly distinct from the malarial catarrhal fever which prevails amongst sheep during the summer and autumn months of the year.

The latter is a special fever, characterized by catarrhal inflammation of the mucous membranes lining the mouth, lips, and the whole of the air passages, with a more or less catarrhal condition of the mucous membrane lining the whole of the digestive tract, accompanied by a high temperature varying from 104 degrees to 107 degrees Fah. and great nervous prostration. The symptoms are, first, a congested appearance of the visible mucous membranes which line the mouth, nostrils, and eyelids, with a rise of temperature and a dull feverish appearance; this is quickly followed by a discharge of mucus, which gradually becomes thicker and adheres to the lips, nostrils, and eyelids. Swelling of the sub-mucous tissue occurs with rapid shedding of the epithelium, followed by excoriations and ulcerations on the

surface of the mucous lining of the nostrils, lips, and on the surface of the tongue. The lips, cheeks, and tongue become greatly swollen, the latter often presenting a purple colour, hence one of the names given to this disease by the Dutch farmers—Bluetongue.

The skin also partakes in the inflammatory action, especially about the legs and feet. Acute inflammation of the coronary band and laminæ of the feet is a common accompaniment, followed by suppuration and shedding of the hoofs. In other cases there is extensive exfoliation of the epidermis, and the fleece peels off from the whole body. During the acute stage the sheep lies almost constantly if not disturbed, and generally with its head doubled round towards its side; so persistent is this position maintained by some patients that after recovery the neck remains permanently twisted. In some localities the disease is much more virulent than in others, and the mortality correspondingly heavier. It is a disease peculiar to sheep, no other species of animal being affected as far as I know. It is not spread by infection, but appears to be indigenous to certain localities. In very dry seasons the disease is much less prevalent, and is confined mainly to low lying districts, while in seasons during which there has been an abundance of rain it prevails over a very large area of the Colony, in the valleys and plains, at an elevation of four or five thousand feet above sea level. The conditions under which it arises are similar to the conditions which give rise to horse-sickness; the disease is contracted when the sheep are exposed to the night air in certain localities, more especially during the prevalence of heavy dews. Like horse-sickness, this fever of sheep is rarely seen on high mountain veld, but is confined to the valleys and plains. It is the local elevation, however, which gives the immunity, and not the absolute elevation of the locality above sea level. It is just as prevalent some years in the kloofs and valleys of such districts as Murraysburg and Richmond as it is in the valleys of Fort Beaufort and Bedford, although the former are over two thousand feet higher than the latter. In a similar manner, if the sheep are collected before sunset and kraaled on the top or side of some small hill in the neighbourhood, and not allowed out to graze in the morning until the sun is up, they are very rarely affected, while complete immunity can be secured by placing them in a proper shed during the night. Further, as Mr. Frost remarks, if a flock of sheep in which the disease is prevalent are dipped in Cooper's, MacDougall's,

Little's, Quibell's, or some of the other sheep dips, the dipping arrests the further spread of the disease at the time. How long this immunity after dipping lasts I have not sufficient evidence to say; that is a point well worth the careful observation of the farmers.

It is from a consideration of all these facts relative to the nature of the disease, the conditions under which it arises, and the means by which it may be prevented, that we have given it the name of malarial catarrhal fever. The question is—what is malaria? The meaning of the word is simply *bad air*, and until recent years it was generally considered to consist of certain gases of a poisonous character, which were generated in the surface soil of certain marshy localities, by the decomposition of vegetable matter. But recent investigations respecting the originating cause of malarial fever in man, conducted principally by Professors Klebs, Tommasi-Crudeli, Marchiafarea and Celli, have clearly shown that "these malarious affections are induced by micro-organisms, which are found in the soil of malarious places, and that these organisms, or *bacillus malariæ* as they are called, after isolation and cultivation, are capable of producing the same form of disease as is contracted from exposure to the malaria in the ordinary manner." Dr. Edington has also shown that horse-sickness, a disease which is contracted under conditions exactly similar to those under which the malarial fevers of human beings become developed, is due to a special micro-organism; and I have little doubt that when the Doctor has time to direct his attention to this special fever of sheep that he will find its originating cause to be some micro-organism which requires similar conditions for its development and appearance in the lower strata of the atmosphere that the organisms of malarial fever and horse-sickness do. In the meantime we should endeavour to utilize the information which we already possess in the preventive and curative treatment of the disease. I have already referred to the preventive effect of placing the sheep in properly constructed sheds during the night, but that is a provision within the reach of very few sheep owners. Farmers are also familiar with the immunity from this disease which is given to sheep when they are taken to certain elevated pasture lands during the season when it is prevalent. It has also been fully established by those who have given it a fair trial, that to kraal sheep during the night at a considerable elevation above the level of the surrounding country is a very effective means of preventing the development of the disease, especially if they are

placed in such kraals before sundown, and not allowed out in the morning until the sun is well up. Further, the fact recorded by Mr. Frost, has been confirmed by many others, that to dip a flock of sheep in which the disease is prevalent has the effect of arresting the further spread of the disease in the flock. It is the first time that I have heard of the lime and sulphur dip having that effect, but it has been known for a considerable time that the carbolic dips, and those composed chiefly of tar derivatives, have the effect of immediately arresting the further appearance of the disease; and Cooper's dip, which is a compound of arsenic, has evidently a similar effect. As already remarked, we have not yet sufficient evidence to show how long this immunity would last, providing that dipping was resorted to at the commencement of the season. I trust, however, that every farmer who has an opportunity of trying it, will record his experience for the benefit of his brother farmers. It is worthy of consideration, also, whether small doses of such substances as Cooper's powder and tar, mixed with the salt given to the sheep as a lick, would not exercise a preventive effect against this disease. Many sheep farmers have been in the habit of mixing tar with the salt which they give to their sheep for some years, and with excellent effects on the general health of their flocks. The sheep take to the mixture very readily when once they are accustomed to it, and amongst other advantages it acts as a preventive of internal animal parasites. Perhaps some of those farmers who have used it where sheep are subject to this catarrhal fever will give us the benefit of their experience respecting its effects as a preventive of that disease.

With respect to Cooper's powder, it has not only been successfully used as a preventive of "geheel-ziekte," and an effective cure for tapeworms, but it has been equally successfully used as a preventive of internal animal parasites, or worms. Mixed with salt in the proportion of one of Cooper's powder to twenty-five of common salt and given to the sheep daily, for a week or ten days at a time, and repeated in the same manner every two months, it has proved one of the best preventives of worms, and I am strongly of opinion that it would exercise a like preventive effect against the catarrhal fever of sheep. At any rate it is worthy of a trial. It is necessary to exercise the following precautions:—The powder requires to be thoroughly and evenly mixed with the salt, and if the sheep are very ravenous for salt, they should be supplied with a sufficiency of clean salt for a few days before giving them the mixture, lest they take too much at the commence-

ment. As I have repeatedly stated, arsenic is much more beneficial to the animal, and much more efficient as a vermicide when given in repeated small doses than when administered in one large dose bordering on the danger point. With respect to lime and sulphur, a little of each added to the salt given as a lick is generally very beneficial, especially during the summer months when fever is likely to be present.

With respect to curative remedies, Mr. Walter Rubidge was the first, I believe, to recommend sal ammoniac (chloride of ammonia) as a cure for catarrhal fever of sheep; he gave it in 10 to 12 grains, dry on the tongue. Mr. Veterinary-Surgeon Soga was very successful with the following mixture:

Corrosive sublimate	½ grain
Calomel	1 grain
Epsom Salts..	1 ounce

mixed and dissolved in a cup of cold water, and repeated daily until the fever abated.

During some experiments which I conducted in 1881, I found the following to act as well as anything that I tried:

Powdered Chlorate of Potash	½ a teaspoonful
Tincture of Aconite	5 drops

dissolved in a cupful of warm water, and repeated twice or three times a day until the fever abates. But a great many remedies have been successfully used by different farmers—such as a mixture of Stockholm tars and flowers of sulphur, a dessertspoonful; a solution of Little's, MacDougall's, or Quibell's sheep dip, and a spoonful of dry, common salt first, to clean the mouth, followed by two ounces of Epsom salts in solution. Another remedy which I have used with very good results is:

Turpentine	a teaspoonful
Powdered Sulphate of Iron	½ a teaspoonful

Dissolve the sulphate of iron in a little hot water, then add the turpentine and administer. Repeat the dose once a day. But whatever medicine may be given, it is of great importance not to disturb the sick animal but as little as possible; it is of great benefit to get the patient under cover, but if it is far away from the homestead, driving it during the acute stage of the fever, does it a great deal of harm. If there are no sheds the sick sheep should be picked out of the flock as early as possible and placed in a paddock or some sheltered place near the homestead where they will not be disturbed. To prevent the shedding of the hoofs, Mr. Soga recommends that the feet be pared down, and blood drawn from the toes freely.

ETIOLOGY OF THE SEPTIC PLEURO-PNEUMONIA OF CALVES.*

BY PROFESSOR GALTIER, LYONS VETERINARY SCHOOL, FRANCE.

SEPTIC pneumo-enteritis is an inoculable bacterial infection, capable of transmission, and calves, lambs, and pigs may contract it through having direct or indirect relations with affected animals, through ingesting food or drink soiled, or inhaling dust mixed with the dried morbid matter. It is a disease which may be introduced into places free from it, by sick or merely contaminated animals recently imported. There are abundant proofs of its transmissibility; these are furnished by simple observation and experiments made in various places, as well as those made by myself; very numerous they have been, on animals of various species.

It results from the inquiry made in the Haute Loire Department; 1. That the affection is unknown in certain communes and rare in others, while it is frequent in a large number; 2. That it has been in existence in some communes for a very long time, but in others it has only been known for a few years; 3. That it prevails in a freely epizootic manner in a great number of communes; 4. That it attacks only a few calves in some places and the total number or nearly all in others; 5. That it sometimes attacks the calves in a certain place at more or less distant intervals, from eight to fifteen days, sometimes more than a month, but it is rare to see several of them fall ill at the same time; 6. That the prevailing opinion in the country inclines to considering the disease as contagious. Although these ideas are not sufficiently precise to carry conviction, yet they must receive serious consideration, as they tend to establish the fact that the *mal de la courade* (the local designation) gains ground.

M. Repiquet on the one side, and M. Habriat on the other, have informed me that a boucher of Retourmac gave the lungs and liver of a calf that had been affected with the disease to a pig to eat, and that this animal contracted the malady and quickly died.

In the second place it is certainly decided from my observations and experiments that the disorder is produced by a living germ; that it is inoculable, and that it is capable of propagation by sick animals and their products. In fact, as I shall presently show, I have extracted from the lesions of the affected animals a germ, which I have been able to

* A communication made to the Paris Central Veterinary Society.

cultivate in artificial media, such as broths, gelatines, etc., and which, when inoculated into healthy creatures, induced the disease in them. I have likewise produced the malady by inoculating animals direct from the lesions of the diseased or with their morbid products. I have, finally, clearly established the fact that cows affected with the disease in a benign or chronic form will perpetuate centres of contagion, that they will infect their progeny, and that these in their turn will infect healthy calves with which they may cohabit.

A study of the etiology of Septic Pneumo-enteritis permits of an examination of the following questions, which I will discuss in succession :—

1. The species of animals susceptible of contamination;
2. Seats of the virus and its ways of excretion;
3. Nature of the virus and characteristics of the pathogenic microbe;
4. Conservation of the virus in external media;
5. Modes of contagion, experimental transmission, and mode of action of the pathogenic microbe;
6. Resistance of the pathogenic microbe, its attenuation and immunity.

1. *Species of Animals susceptible of Contamination.*

It is stated in the report of Dr. Coiffier on the enquiry made by the Agricultural Society of Puy: "The mayors of . . . have seen the disease sometimes co-exist with other maladies, and in particular with swine erysipelas (*Rouget*)." M. Breysse informs us that the disorder often attacks lambs a month old, and that the sick creatures linger on for fifteen days, become emaciated, and suddenly succumb. He adds that, internally, they present the same appearances as the calves, and that nearly four hundred lambs perish annually from the disease in his commune. M. Pascal, of Puy, has witnessed an almost identical affection to the *mal de la courade* prevailing at the same time among sheep and pigs. M. Repiquet has also frequently seen pigs affected with pneumo-enteritis at the same time as sheep, and he believes there is more than an analogy between the diseases in the two species. At present the evidence is complete on this, so far as my observations and experiments are concerned; the *mal de la courade* may attack simultaneously animals of the bovine, ovine, caprine and porcine species—calves, lambs, kids and porcelets; it is transmitted spontaneously and experimentally to animals of these species; and it may be

propagated from one to another species. I have found the same germ in the calf, the lamb, and the pig; I have isolated it, cultivated that derived from each species, and its inoculation has always produced the same disease, no matter what species it was obtained from. I have produced the malady by inoculating from the lesions in the calf, or by means of the purified germ I have extracted by cultivation; and I have also produced it from the lesions of the lamb and pig, as well as from cultures derived from these. I have experimentally transmitted the disease to the calf, sheep, goat and pig. Adults are much more resistant, and may not become ill when juvenile ones do so; when they do contract the disorder, it is most frequently in a benignant form.

Among the experimental animals employed concurrently in the laboratories, the rabbit and guinea-pig become affected when they are inoculated from the lesions or the cultures derived from the four species above mentioned; and the disease is readily communicated to these originating species after this passage through the organism of these two kinds of animals. I have not experimented upon the horse, but there is nothing to indicate that the disease can be conveyed to solipeds, nor yet to dogs.

I have made five experiments upon dogs, and notwithstanding the large doses inoculated and recourse to the most dangerous modes of inoculation, the results have been negative. The dog seems, therefore, to be absolutely refractory; this is unfortunate, because if it became seriously ill and died the owners of animals would be more convinced of the contagiousness of the malady and the usefulness of prophylactic measures, and would not refer to this creature as they do sometimes, and because of its refractoriness after eating diseased flesh, as affording doubt as to the contagiousness of the affection.

To sum up, the septic pneumo-enteritis of calves will assuredly affect lambs, kids and porcelets, and also, though often in a benignant manner, cattle, sheep, goats and adult pigs.

2. *Seat of the Virus and its channels of Excretion.*

The germ of the disease is met with almost everywhere throughout the organism of those suffering from the acute and serious form.

In the calf it is found in all the lesions, in those of the muscles, the congested lymphatic glands, the effused fluids and in the exudates on the peritoneal, pleural, and pericardial

serous membranes, as well as in the diseased lungs, the liver which is congested and undergoing degeneration, the spleen, the kidneys, and in the mucous membrane of the intestine. It also exists in the blood, although less abundantly than in the exudates, for example, and it is to be found in the products of the morbid secretions, such as the nasal discharge and the diarrhœa, and even in the urine when the kidneys are altered. In lambs and young pigs, as well as in the rabbits and guinea-pigs, it is about the same as in the calves; all the lesions and the morbid products are virulent. I have produced the malady by inoculating from all kinds of lesions, effused fluids, exudates, divers morbid products, and even the urine.

It will therefore be readily understood that the sick animals sow the contagion around them in discharging morbid matter, soiling food, water, and litter, and everything in their vicinity. And, on the other hand, it will be comprehended that the fashion of bleeding the sick animals which nearly everywhere prevails, and of allowing dogs, cats and fowls to drag about and devour the *débris* of the dead creatures, largely contribute to disseminate the germs, and to perpetuate and extend the contagion.

In the animals which have the disease in a chronic or benignant form, the virus is less abundant, the lesions not being so extensive, and there may be no morbid excretions. Yet in these cases the lesions are virulent, as well as the morbid excretions, such as the nasal discharge, and the expectoration and diarrhœa when they chance to be present.

In fine, every sick animal is more or less dangerous, according to the seriousness of its condition. Its morbid excretions, nasal discharge and excremental matters may transmit the affection and soil forage, water, litter, sheds, and objects of all kinds, which will, in their turn, contaminate healthy creatures; the carcase and its *débris* are also dangerous, and the blood, morbid products and diseased organs may taint the things with which they come in contact, and may be dragged more or less far by carnivorous animals or poultry.

Not only are the diseased animals and their carcases and *débris* dangerous, but also everything which has been soiled by the morbid matters, the nasal discharge, expectorated material, diarrhœal products—all those articles which have been soiled with the blood of the animals or their lesions at the moment of slaughter or when opening the cadaver, as well as all those that dogs and poultry have soiled in pulling about the remains. The animals capable of contracting the

disease—calves, lambs and pigs—may become contaminated by licking the soiled objects, or ingesting infected food or water. And when contagion does not occur in this way, it may do so by inhalation. The morbid matters resist desiccation, preserve their potency on the soil, racks, mangers, and troughs, in forage and litter, etc.; they can be reduced to powder, and in this form enter the air passages or mix with the food. It is by this mode of contagion that the disorder is most actively propagated.

It is, then, through uncleanliness and the absence of disinfection, as well as the retention of diseased mothers and neglect in isolating sick animals, that the propagation and persistence of the epizoöty is favoured.

The period of incubation, if we are to judge from the experiments and observations I have already alluded to, is usually brief—varying from some hours to a few days, according to the strength of the animals and their age, and the quantity of germs introduced, &c.

3. *Nature of the Virus and Characteristics of the Pathogenic Microbe.*

The inoculated, as well as the spontaneous disease, is determined by a special microbe, which has been already studied by Pöels, and the presence of which I have noted in all the lesions in animals that have acquired the disorder spontaneously, as well as in those of the inoculated creatures which have been experimentally rendered diseased from the lesions of the former. This microbe is particularly abundant in the most acute lesions and in the exudates. I shall in the meantime designate it the *Pneumo-bacillus septicus*.

I have already remarked that the same microbe is always found in animals of the different species which are susceptible of contracting the *maladie de la courade*. I have prepared and studied it; I have sown it in broth and other artificial media, and I have cultivated it in a state of purity after obtaining it from the calf, pig and lamb. I have, besides, passed it through numerous media in succession and then inoculated it, and I have always produced the same disease.

Its morphology varies slightly according to its age and media in which it is developed; so that in a given medium, in a diseased organism, we may meet, side by side, germs somewhat different in shape and appearance. It may appear in a round or ovoid form, or more or less elongated. In the calf it affects these three forms: it is almost round or ovoid in the smaller vessels of the lungs, where it sometimes

constitutes a more or less voluminous mass; in the lesions of the muscles it is rounded, ovoid, or appears as a very short rod; and usually two germs are seen in juxtaposition, so as to simulate a diplococcus or figure of 8 shape. In the other lesions—lungs, exudates, etc.—it shows itself in the form of rods, two, three, four, or five times longer than they are broad, and rounded at the ends. In the lungs of the pig it is ovoid or slightly elongated—in the lamb, rabbit, and guinea-pig it assumes the same ovoid or elongated shape—and it is nearly round in the lesions of adult sheep and goats. It has the same morphology in artificial media. In cultivations, as in the lesions, it is seen to form groups arranged as short chains, composed of two, three, four, or five germs. It is a microbe which is readily seen and is easy to prepare; it is endowed with very distinct movements, and is stained without difficulty by hydro-alcoholic solutions of gentian violet, methyl violet, fuchsin, rubin, etc., and it is bleached by Gramm's method. Usually, after slight staining, the ends are noticed to be well coloured, while the centre appears clear or depressed.

The *Pneumo-bacillus septicus* is reproduced by fission and sporogenesis. In old cultures there can be distinctly seen one, two, and sometimes three bright points or germ-corpuscles in the majority of the bacilli; there are also seen rows of spores, still held in file, though somewhat distant from each other, by a kind of amorphous substance; and there is also a variable number of free spores. Like those of symptomatic anthrax, these are all coloured under the influence of a high temperature. Boiling does not sterilise cultures which have attained a certain age, as we shall notice hereafter.

The bacillus of septic Pneumo-enteritis is one of the easiest to cultivate. It is ærobic and anærobic, and develops very rapidly in all artificial media, even at a temperature of 12° to 25° Cent. It grows in all kinds of broths and vegetable infusions, as well as on gelatine, agar-agar, and potato. In two to five days, at a temperature between 15° to 25° Cent., it multiplies very abundantly in broths, which become turbid and present what looks like a fine dust suspended in their different layers, and especially the inferior ones; in the course of time, the medium becomes clear, and there is formed a powdery precipitate, the particles of which are somewhat large and of a yellowish colour. Cultivated on gelatine, the microbe gives rise to whitish colonies which, in coalescing, form a pellicle; it does not liquefy gelatine in ordinary

conditions, but it does so with regard to recently-prepared media, in which that substance is less abundant. It grows in glycerined media. Sown by deep puncture in gelatine, it produces whitish colonies which, in uniting, form a long streak. Cultivations on agar-agar and potato do not offer anything very characteristic; it grows rapidly and well, particularly at 37° and 38° Cent. The *Pneumo-bacillus septicus* develops in all culture media, as well as in the subcutaneous connective tissue and the peritoneum of the guinea-pig after inoculation, an odour *sui generis*, but somewhat like that of the vessels in which the peasants keep whey.

4. *Preservation of the Virus in External Media.*

My experiments relative to the search for the pathogenic bacillus in forage, demonstrates that this material preserves it well and for a long time, notwithstanding the fermentations, desiccations, and variations in temperature it may undergo.

The morbid productions and lesions maintain their activity, notwithstanding the intervention of such agents as air, light, and heat, or putrefaction and desiccation; and I have ascertained, by numerous trials, that it takes a long time for the virulence to become attenuated and ultimately disappear. Polluted water, soiled pastures and forage, woodwork, ground, and solid objects, which have been impregnated with the virulent products, as well as manure—solid or liquid—which may contain them, preserve for weeks and months their pathogenic action, in spite of putrefaction, drying, etc.

Virulent matters left for thirty days exposed to the air on filtered paper, preserved all their potency, notwithstanding cold, as low as 16° cent., repeated freezings, and a quasi-desiccation; while a continued desiccation for sixty-nine days in the laboratory, at a temperature between $+8^{\circ}$ and $+23^{\circ}$, did not sterilise virulent matter enclosed only in a paper filter.

Virulence is retained for a long time intact in various culture media, even when they are exposed to the air, to ordinary light, and to variations of temperature. I have on many occasions noted the activity of cultures from two to nine months old; and I have also produced the disease by inoculating with cultures which had been made from nine to fourteen months; though I have then often found that they were more or less attenuated by age, as we shall see presently. Having left cultures from four to six months old exposed to impure air, in order that they might putrefy and be invaded by moulds, I found that putrefaction and the appearance of fungi did not destroy their virulent activity at the end of from

two to four months. These mouldy and putrefied cultures, submitted to slow evaporation, yielded a residue which, when dried for some days, was still potent, and caused septic pleuro-pneumonia.

To sum up, the *Pneumo-bacillus septicus* enjoys the faculty of maintaining its activity for a long time in external media, owing to its spore-yielding property. It resists desiccation, and putrefaction, the action of air and water, of diffused light, and of variations of temperature. I have recently observed that cultures and virulent matters frozen to eight degrees below zero (centigrade), had lost nothing of their activity; and we shall see hereafter that the boiling temperature is not sufficient to sterilise old cultures with certainty.

5. *Modes of Contagion. Experimental Transmission. Mode of Action of the Pathogenic Bacillus.*

A. MODES OF CONTAGION.—After having indicated the part played by insanitary habitations, and dusty and mouldy food and litter, in the production of the disease, a large share in this must be ascribed to contagion, in which many owners of animals already believed, though they chiefly blamed the diarrhœic matters from the sick as operating in extension. Notwithstanding that certain persons pretend the disease is not contagious, that it is not conveyed from sick to healthy, that the isolation of healthy calves will not prevent their becoming unwell, and that healthy calves have been known to escape contamination, though cohabiting with diseased ones, it is none the less a fact—as I shall show presently—that the affection is transmissible.

If healthy calves, lambs and pigs, have not suffered from cohabitation for a more or less prolonged period with diseased animals, we cannot deduce from this circumstance absolute proof of its non-transmissibility; for in all contagious disorders—even the most acute—all those which are exposed to them do not suffer. On the other hand, it is well authenticated that one case only does not occur on a farm where the animal population may be ever so few, for it will happen that a more or less numerous portion will become affected. It is also known that the epizooty becomes successively implanted in diverse localities where it was previously unknown. In fact, it is now impossible to deny the virulence and the transmissibility of the *mal de la courade*, thanks to my observations and experimental researches.

The affection is hereditary; mothers which are diseased, even when they do not present serious symptoms, and the

owner may not perceive illness, may convey the germs to their progeny, which become affected before birth and are aborted, or manifest the malady after they are born.

Diseased animals certainly become sources of contagion, and if they do not communicate the disorder directly to those with which they cohabit, they will infect a more or less considerable number in an indirect manner, by contaminating with their morbid products, localities, watering-places, litter, forage and diverse objects, which will one day or other propagate the contagion, either by the dust they will disengage or by their being ingested.

Transmission of the disease takes place more particularly through inhalation of the morbid matter which has been thrown off by the sick; in drying this preserves its activity and is introduced in the form of dust into the air passages. The ingestion of soiled forage and water may also, though less surely, communicate the malady.

Not only the diseased, but their carcases and cadaveric *débris* are dangerous, as well as everything soiled by the morbid matters—the nasal discharge, expectorations and fæces, no less than those soiled with the blood of the diseased or their lesions at the time of slaughter or necropsy, and all those which dogs and fowls have soiled in pulling about the *débris*. The animals capable of contracting the malady—calves, lambs and pigs—may become infected through licking soiled objects, or ingesting tainted food or water. And when transmission does not occur in this way, it may through inhalation. The virulent matters resist desiccation, and maintain their potency on the soil, racks, mangers and troughs, as well as in forage, litter, etc.; and they may at a given moment be reduced to dust, and obtain access to the body through the respiratory organs or the digestive apparatus. It is by this mode of infection that the disease is most actively propagated.

In *resumé*, it is to bad hygiene and neglect of disinfection, as well as the retention of diseased mothers and non-isolation of the sick, that the propagation and persistence of the scourge are mostly due.

The incubation period, according to my experience, is usually brief, varying between a few hours and some days, according to the strength of the animals, their age, the quantity of germs introduced, etc.

B. Modes of Experimental Transmission.—Experimentally, septic pneumo-enteritis may be communicated by either of the following modes:—

(a.) *By intrapulmonary and intratracheal injection.* By this mode the disease can be very rapidly produced in the calf, sheep, goat, pig, rabbit and guinea-pig, with predominance of the pleuro-pulmonary lesions.

(b.) *By simple nasal injection.* I have many times transmitted the disease to the rabbit by injecting a few drops of culture or virulent emulsion; and here again the broncho-pulmonary lesions predominate.

(c.) *By intravenous injection.* I have more especially practised this method of inoculation on the rabbit, and it is certain to produce the disease provided a notable dose of the virus is introduced. The inoculated animals may live only a few hours or for several days. In the first instance, there are congestion and hæmorrhagic lesions in the majority of the organs, even in the muscles. In the second, the lesions appear to be localised in the liver, in the form centres of degeneration, aud sometimes in the subcutaneous tissue as purulent foci, etc. In some cases I have seen the malady become acute after assuming the chronic form, and the lesions of the first becoming grafted in those of the second.

(d.) *By intraperitoneal injection.* I have very frequently employed this method in my experiments on rabbits and guinea-pigs, and it appears to me to be the most certain. After intraperitoneal injection, the disease is developed in some hours, a day, day and half, or two days. There is violent peritonitis, with viscid effusion and a pseudo-membranous exudate, enteritis, congestion of the liver and kidneys, etc.

(e.) *By subcutaneous injection.* Rabbits and guinea-pigs inoculated by subcutaneous injection, offer, in addition to the internal lesions just enumerated, a local lesion which may remain limited, or be accompanied by internal alterations that are of little importance when the inoculation has been made with a very feeble dose of the virus, or with attenuated microbes.

(f.) *By ingestion.* It is only exceptionally that rabbits and guinea-pigs take the disease when the experiment is limited to making them ingest the virulent matter; but they do become affected sometimes.

(g.) *By intra-ocular injection.* I have inoculated some rabbits by injecting one or two drops of culture into the anterior chamber of the eye, and in all the cases the disease did not advance beyond destruction of the eye.

C. Mode of Action of the Pathogenic Bacillus.—The *Pneumo-bacillus septicus* gives rise to symptoms of broncho-

pneumo-pleuritis, entero-peritonitis, lameness, etc. It causes congestions, hæmorrhages, effusions, exudations, degenerations, and necroses. It secretes substances which act in this way, and which may produce all the signs of the affection when they are employed after the microbes have been killed. I have killed rabbits and guinea-pigs by inoculating them with cultures sterilised by a proper degree of heat; they exhibited all the lesions of septic pneumo-enteritis, *minus* the microbes. In the Chamberland filter the toxic matters are arrested and some microbes may pass on.

6. *Resistance of the Pathogenic Microbe. Its Attenuation and Exaltation. Immunity.*

We have mentioned that the *Pneumo-bacillus septicus* resists putrefaction, desiccation, the action of the air and diffused light, variations of temperature and freezing; and that it may preserve its activity for a long time in the culture media in which it has grown. I have, besides, studied the action of certain chemical substances, as well as the action of heat upon it. It results from my investigations that the best bactericide solutions to be enumerated in the practice of disinfection are: iodine and bromine water, a four per cent. solution of sulphuric acid, hydrochloric acid or carbolic acid, and a one per cent. solution of corrosive sublimate. The contact of these various substances ought to be prolonged for a certain time, and it is well to give two consecutive washings to the surface of soiled objects.

I have made numerous trials with cultures submitted to a boiling temperature, and have noted the results, which were variable according to the age of the cultures. Those which were not more than eight days old were sterilised by two minutes boiling, but the substances secreted by the microbes had not lost their properties. Those which were more than nine months old resisted a first boiling of two minutes, and, sometimes, even a second boiling twenty-four hours afterwards.

If it be true that the pneumo-bacillus septicus resists the various influences which we have passed in review, it must yet be added that it often experiences more or less marked attenuations or weakenings. Cultures exposed to the air are manifestly attenuated after the first six to eight months; and the same change occurs to microbes which have been cultivated in broth (*bouillon*) and exposed to prolonged desiccation. Cultures seventeen months old, when boiled for five minutes, may be inoculated into rabbits and guinea-pigs,

and calves aged eight months, without danger; not only do these cause no harm, but they confer immunity. Attenuation, with a view to conferring immunity, may also be effected by means of oil of turpentine. Attenuated or simply weakened microbes may be restored to their pristine potency by passing them through a young calf, and also by a series of cultures in the rabbit and guinea-pig.

My numerous researches made on rabbits and guinea-pigs, with the view of determining if a first attack of the disease conferred immunity, allow me to formulate the following conclusions: In certain cases a primary attack, whether it results from an intravenous or an intra-peritoneal injection, does not prevent the animal from contracting the disease a second time; the young produced by a female inoculated during gestation do not inherit immunity; and in very numerous instances the animals which have resisted a first attack are found to be endowed with more or less complete immunity.

An eight months old stirk, inoculated in the vein with an attenuated culture, afterwards resisted the intra-tracheal injection of a strong dose of the virus. Numerous guinea-pigs and rabbits have been endowed with immunity by inoculation with old cultures heated to the boiling point for five minutes. I have, finally, succeeded in preparing vaccines by treating old cultures with oil of turpentine. After many attempts I have arrived at the following *modus faciendi*: One hundred cubic centimetres of culture and twenty of oil of turpentine are emulsioned together in a flask closed by a ground-glass stopper; they are well shaken for a short time, and then allowed to stand for sixteen to twenty-eight hours, after which the fluid is filtered through paper until one hundred cubic centigrammes are obtained. It is this material which can be employed to confer immunity. I limit myself, for the present, to these summary indications of the method to be employed in obtaining protection, which succeeds with small animals; it will be tried with calves during the course of next year.

Symptoms of Septic Pleuro-pneumonia or Septic Pneumo-Enteritis of Calves.

There has been observed in Holland and Belgium a disease of young calves which offers a certain degree of anatomo-pathological resemblance to Contagious Pleuro-pneumonia, and to which the name of Septic Pleuro-pneumonia has been given. This malady prevails in a really grave manner in

various regions in France, and I have observed it in the departments of Haute-Loire, Loire, Allier, Puy-de-Dome, Correze, Cantal, Crease, and Ardeche. There it has received several designations, among others "Maladie de la Courade," "Maladie des Veaux," "Broncho-pneumonia" or "Pneumo-enteritis of Calves." It seems to me that the denomination which is best applicable to it from a scientific point of view is that of "Septic Pneumo-enteritis," as its symptoms and lesions denote alterations, not only in the organs of the respiratory apparatus, but likewise in those of the digestive apparatus and others; and also because it is really a bacterial disease, the active agent of which, derived from ambient media, may multiply in numerous organs, give rise to more or less extensive lesions, and secrete toxic substances in greater or less abundance.

This Septic Pneumo-enteritis affects animals of the bovine, ovine, caprine and porcine species; and it more especially attacks young animals, principally young bovines. Calves are usually affected between the fifteenth and sixteenth days after birth, although there are some which are seized with it during the first fifteen days of their life—some even at birth; and it sometimes happens that the affection attacks calves two, three and four months old, and even adults, though these do not suffer so severely.

Septic Pneumo-enteritis varies in the intensity of its symptoms, the rapidity of its course, and its terminations. It is most serious, most rapid in its course and fatal in its termination, when it attacks young animals, when the pathogenic agent is introduced into the organism in large doses, and when the animals are placed in defective hygienic conditions.

When the disease assumes the grave form, which it usually does in young animals, it manifests itself in an alarming manner from the commencement. The appetite disappears, the body temperature is raised, and the circulation and respiration are accelerated; the flanks heave violently and the animals are breathless; the heart's action is tumultuous, and the mucous membranes are congested. Sometimes the calves succumb quite suddenly after some instants of illness, but in the majority of cases they live for from some hours to one or two days, and some may resist it from four to eight days.

Debility sets in rapidly, while at the same time the respiration becomes more and more modified, the circulation is increasingly disturbed and signs of enteritis appear. One of the most important characters of this affection consists, as I was the first to clearly establish, in an alteration in the

muscular system; the limbs become rigid, the anterior ones more or less bowed forwards, the hind ones being carried under the body; the animals stagger and can scarcely stand; they are with difficulty moved, and then they stumble and limp, while they appear to suffer extremely, as is shown by their expression and the exacerbation of the respiratory symptoms.

The breathlessness becomes more and more marked; the respiration is short and difficult, and is sometimes accompanied by a moan at each breath; the chest is more sensitive to pressure and percussion; there is dulness on percussion, and there are *râles* and tubal blowing heard in auscultation. Usually a fœtid diarrhœa sets in along with the advent of these symptoms, and it is not rare to witness sweatings, congestion of the buccal mucous membrane and tongue —which is sometimes protruded and violet in colour—foaming at the mouth, and bellowings and distress at the approach of death.

When the surrounding conditions are defective, the majority of the calves attacked die rapidly. There is a notable depression of temperature at the approach of death; the limbs are chilly; certain of the animals perish from suffocation, and the majority seem intoxicated by the products engendered by the morbigenous germs. Some of the affected resist for a longer time, to die subsequently after having become considerably emaciated, or they recover more or less completely.

Young lambs, kids and porcelets offer analogous symptoms to those seen in the calf. The lambs and kids have fever and are breathless, the limbs are rigid and there is lameness, with intestinal derangement, chest symptoms, etc. The majority speedily succumb, though some hold out for a time, feed badly, lose condition, and eventually die in a state of consumption. The porcelets, and also pigs some months old, somewhat frequently contract the disease in a grave form, and the symptoms they then show have much resemblance to those of infectious pneumo-enteritis and erysipelas (*rouget*). There is fever, hurried breathing, chest symptoms, fœtid diarrhœa, debility, and often red or violet patches on the surface of the body; the creatures become rapidly emaciated, and die in large numbers.

Those animals which are more than some months old, adults, and those which are placed in good hygienic conditions, have more chance of being affected with the disease in a benign form. So it is that in adult bovines the lesions most frequently remain localised in the lungs, liver and lymphatic system, and are limited in extent. The symptoms are not very marked, and consist in a state of *malaise*, cough,

and signs of broncho-pneumonia, etc. Cows which are attacked in this way are not readily got in calf, and when they are so they either abort or the calf is ill at birth.

The calves which are placed in favourable conditions, and particularly those which live in a pure atmosphere, may be affected very mildly, live a long time, and overcome the disease, which terminates either in complete resolution or passes into the chronic form, in which they exhibit symptoms of broncho-pneumonia, cough, nasal discharge, and diarrhœa from time to time. Adult pigs and the smaller adult ruminants may also have the benign form, with cough and symptoms of broncho-pneumonia, etc.

Septic pneumo-enteritis annually occasions considerable losses, and constitutes a veritable scourge to breeders in certain regions; in the cowsheds it visits it may kill the calves in a proportion varying between a tenth and eight-tenths; while it may cause serious ravages among sheep and pigs. I have visited many localities and farms where it had become a disaster, because of its persistence and the mortality it produced. I have demonstrated how much its ravages, persistency and extension, were facilitated by the absence of prophylactic measures, and bad hygienic conditions—notably, foul habitations and improper food; and I have collected facts which prove that calves which are very sick, feeble and breathless, may rally somewhat quickly when put into a well-ventilated place, instead of leaving them in the confined area and miasmatic atmosphere of the abode where they had acquired the disease.

Editorial.

THE SUPPRESSION OF SWINE PLAGUE.

CONCURRENTLY with the issue of the present number of the VETERINARY JOURNAL the Swine Fever Act, as it is termed, comes into operation. This, in reality, is an Act to confer further powers under the Contagious Diseases (Animals) Acts extending from 1878 to 1892, and ordains that any money applicable under the Pleuro-Pneumonia Act of 1890, shall be applicable in cases of Swine Fever, and any powers exercisable under that Act may be exercised with respect to the porcine malady; those powers giving the right to adopt such measures under the Contagious Diseases (Animals) Acts of 1878 to 1892, as may seem to the Board of Agriculture or to the Lord Lieutenant and Privy Council of Ireland, necessary for preventing the spread of the disease. The compensation to be paid for any animal slaughtered is to be of its value immediately before slaughter, or if it were diseased, one half of its value immediately before it became affected. After the expiration of the present financial year, of the money provided by Parliament for the suppression of contagious pleuro-pneumonia, not more than fifty thousand pounds are to be provided for the extinction of the disease in any one year.

The term "disease" in this Act is to include "Swine Fever, that is to say, the disease known as Typhoid Fever of Swine, Soldier, Purples, Red Disease, Hog Cholera, or Swine Plague"; and this is a wise inclusion, for probably under the designation of Swine Fever two or more contagious maladies are included. That two or three destructive disorders of swine have been prevalent in the United Kingdom for a very long time, there can be no doubt, and though the unsatisfactory name of "Swine Fever" was employed by the Government authorities to designate them, yet little has been done to elucidate their nature or to establish their differential characteristics; while almost as little has been attempted to suppress or control them: and it was not until strong and continued pressure was brought to bear upon the Agricultural Department, that anything worthy of the name of suppressive measure was introduced in the shape of this Act. But this has been the history of our dealing with the contagious diseases of animals in this country. The Government has always been far behind public opinion, and could never take the initiative in combating them; it has only been by

constant urging that it could be induced to move, and then its action has been slow and tentative. Even the present Act is imperfect, and we shall watch with some interest and curiosity its effect on the spread of the scourge. For it must not be forgotten that some authorities who have carefully studied the disease are not of opinion that it should be classed with such animal contagions as contagious pleuro-pneumonia, foot-and-mouth disease, and cattle plague, and that the measures which would be successful in eradicating them might not be so in the case of the so-called Swine Fever.

However, as the disorder is not so widely prevalent as was contagious pleuro-pneumonia, and as the number of animals liable to be attacked is comparatively small, there should be much less difficulty in dealing with it.

THE HEALTH OF STOCK IN QUEENSLAND.

Mr. Gordon, Chief Inspector of Stock for Queensland, has issued his report on the health of stock in that important colony for 1892, and it contains some important information. With regard to diseases it is stated, with regard to sheep, that intestinal worms again appeared in many flocks in the eastern districts, and that a few cases of foot-rot had been introduced from the adjoining colony to a few of the border runs.

Contagious Pleuro-Pneumonia.—This disease has been somewhat prevalent among travelling cattle during the year, although the losses from actual deaths have not been heavy. Of late we have been somewhat unfortunate in having several breaks in the continuity of the cultivation of virus for inoculation, although a large quantity has been distributed from this office during the year. Doctors Germont and Loir, while here, strongly recommended the practice of injecting the virus in the tail by means of a syringe instead of the usual seton. The difficulty in the way of this was that with ordinary operators the common hypodermic syringe was not sufficiently strong for the purpose. Mr. F. A. Blackman, however, has invented a syringe specially adapted to the purpose, which I tested by inoculating some calves in the tail, in the Quarantine Grounds; afterwards submitting them to a second test by injecting a large quantity of virus behind the shoulder, and they proved quite immune to the second inoculation. This syringe can be used by any stockman, and with as great facility as the needle and seton, the insertion being made from the point of the tail upwards, instead of across as with the seton. It was submitted to, and received the approval of, Dr. Loir, after some modifications suggested by him had been made to facilitate its being sterilised after use.

"Rickets."—This (so-called) disease—paralysis of the hindquarters—has been prevalent, to some extent, for twelve years past on portions of the east coast watershed, and a similar disease is also prevalent in a limited district of Western Australia. In consequence of its prevalence being so far confined, in both colonies, to country on which the Zamia palm—*Macrozamia miquelii*—grows freely, the disease was naturally attributed to the cattle feeding on that plant. This theory, however, was met by the fact that the Zamia had been growing on the same land ever since the country had been taken up for pasturage; whereas the disease had only in very recent years made its appear-

ance. Dr. T. L. Bancroft having been engaged to make inquiry into the subject, spent some time in the centre of one of the affected districts, and after careful research came to the conclusion that it was attributable to the Zamia. Two practical experiments since made have proved almost to a certainty that the disease is in some measure due to the cause attributed. Mr. William Norton, of Yeppoon, fed a heifer with the plant, which developed the disease in fourteen days. Of much greater value, however, was an experiment made by Dr. William J. Tilly, on Milton Station, Gladstone. Dr. Tilly placed six young cattle, all free from rickets, in three lots of two each in a shed, feeding one lot on lucerne and chaff mixed with chopped Zamia leaves, one lot on lucerne hay only, and the remaining lot on crushed Zamia fruit and lucerne chaff. Those fed on Zamia developed rickets in due course, while those fed on lucerne hay remained free from disease. Before turning out the two fed on lucerne, he determined to feed them also on Zamia, with the result that after the usual interval they also developed well-marked symptoms of the disease. There is, therefore, little doubt but that the only means to prevent this disease will be to clear the runs of the plant. Whether the cost of this will be such as to deter the occupants from adopting it remains to be seen; but I am given to understand that the expense will not be nearly so great as ringbarking the trees, and that mode of improving pasture has been largely adopted in many places.

Tuberculosis and "Lumpy Jaw."—The boiling works that have been established in different parts of the colony have afforded the means of culling out cattle suffering from these diseases and cattle coming under the designation of "wasters," and of turning them to profitable account; and it is perhaps not too much to say that never before have the herds of Queensland been so closely culled of diseased and unthrifty cattle. To a very large extent this has been due to the appointment of honorary commissioners under the Diseased Animals Act, which took decisive steps to prevent the traffic in diseased cattle as human food, and in doing so they were working in the best interest of the cattle-breeders.

Ticks.—A somewhat alarming report was received from the Gulf district of cattle having been infested with ticks to such an extent as to destroy numbers of those infested. An investigation into the matter greatly modified the first reports. It appears that those ticks only appear to any extent in seasons of severe drought, such as that through which the Gulf district has just passed, and it is only cattle in very poor condition that become infested. I have been favoured with a report from Mr. A. S. Ohliff, Entomologist to the Department of Agriculture for New South Wales, on specimens of the ticks sent him.

Mr. Ohliff says:—"The tick is the true cattle tick, generally known as *Ixodes bovis*—Riley, but sometimes called *Boophilus bovis*; and they represent three conditions of the species, normal males and females (the latter easily recognisable by their larger size), and males and females distended with blood. In reply to your inquiries—(*a*) as to whether any portions of their lives are spent on trees or other plants, and (*b*) whether they derive their nourishment from the blood of their host—an affirmative answer may be given in both cases. The true cattle tick, however, is much less given to wandering than some other species of Ixodes, a number of which are known as wood ticks and ti-tree ticks. As a preventive measure, it is advisable, in badly infested districts, to keep cattle away from thickly-wooded pastures, and it is recommended the infested cattle be supplied with sulphur and salt." Mr. Ohliff also recommends treatment by kerozine, emulsion of kerosene, and lard; but although this is applicable in the case of valuable stud cattle, the treatment would, of course, be impracticable in the case of bush cattle.

Warbles in Cattle.—Mr. Irving, the Government Veterinary Surgeon,

detected a number of warbles—the grub-like larva of the Œstridæ (*Hypodermis bovis*)—in two bulls imported early in March last from England. These warble flies, according to Miss Ormerod, formerly depreciated the value of hides in Great Britain to the extent of several millions sterling annually. As this insect in its perfect state lives during the months of June and July in England, and in this state lays its eggs in the skin of cattle, cattle imported into Australia that have left England during or after the months that the fly attains its perfect state, should undergo a very close veterinary inspection on arrival and during the currency of their term in quarantine.*

ANTHRAX.—A case of this disease was discovered in cattle at North Pine by the Government Veterinary Surgeon, and his diagnosis was afterwards confirmed by Dr. Hirschfield.

MANGE.—The disease popularly known under this name is still prevalent in the colony during the warm months, but not to such an extent as formerly. As, however, it seldom attacks horses that are constantly stabled and groomed, and as it yields temporarily to many dressings, it does not occasion the annoyance it did a few years ago. The most common and apparently effective treatment now generally adopted is kerosene emulsion, prepared by heating Stockholm tar almost to boiling point, and in this state kerozine is added, and the mixture stirred until almost cool. After being washed, the affected parts are thoroughly painted over with this mixture, and it has been seldom known to fail.

REPORT ON THE ETIOLOGY AND PATHOLOGY OF "LOUPING ILL."

[In the last issue of the VETERINARY JOURNAL, an abstract of Dr. Klein's report on "louping ill," made by Mr. Wheler, was published. The report itself, *in extenso*, has appeared in the Journal of the Royal Agricultural Society for September 30th, and as it is of great value, it is deemed advisable to republish it here.]

By the invitation and wish of His Grace the Duke of Northumberland, I have made an inquiry into the nature of the disease known in the north-west of Northumberland as the "louping ill," and in the following pages I beg to report on the results of this inquiry. At the outset I wish to express my obligation to Mr. E. G. Wheler, the Duke's Commissioner, who, with great readiness and promptitude, made every endeavour to render this inquiry during my stay at Kielder as fruitful as possible. Amongst others to whose assistance I am beholden, my acknowledgments are especially due to Mr. Walter Hedley, of Bewshaugh Farm, from whom I not only received most useful and reliable information, and his personal assistance in many ways, but who also, at no small inconvenience to himself, placed his buildings at my disposal for the purpose of making my *post-mortem* examinations.

Nature of the disease.—As is well known, the chief and most conspicuous symptom of the disease manifests itself in disorder of the muscular function of the head and limbs consisting in abnormal contractions, loss of co-ordination of movement, and ultimately in loss of movement of the limbs altogether. During the earlier phases of these symptoms, which generally repeat themselves in paroxysms, the animals show actual or intended jumping movements; hence the popular name of "louping ill."

With the first onset of the disease the animal is quiet, does not feed, and separates from the rest; it shows at the same time loss of muscular power, and periodic contractions (trembling and cramp) either of one limb or another, or of the extensors of the head; soon (next day), this abnormality is much

* From these observations it would appear that the *Hypodermis bovis* is not seen in Australia, an interesting fact which deserves to be recorded.

accentuated, the animal shows paroxysms of more extensive cramps when attempting to stand or to walk, and a more or less deficient co-ordination in the movements of the limbs, so that, while attempting to walk, its gait becomes perfectly unsteady, and its movements more like "the reeling and the antics during alcoholic intoxication," as one farmer graphically expressed it. It is during such paroxysms that the symptom of louping, or jumping, becomes apparent. Either on the same or on the next day the animal is altogether unable to move its limbs, or is capable of doing so only in a very imperfect manner, or for a short period, and therefore remains for long periods lying motionless on its side. In this state the movements of the nostrils, mouth, tongue, eyes and ears seem unimpaired, and the animals are able to notice everything that is going on around them, to take food and to swallow.

Death generally supervenes rapidly—within from a few hours to a day—after the animal has reached this phase. The climax often occurs unexpectedly, even before this phase is reached, since it is not unusual that animals, supposed to be only "slightly affected," or being on the mend in the evening, are found dead the next morning. But, as a rule, death is preceded by some hours (up to a day or two) by the state of more or less complete loss of movement of the limbs.

Among other and less conspicuous symptoms to be noted not unfrequently, in animals markedly affected in the above manner, are a rapid beat of the heart, rapid, sometimes laboured, respiration, and rise of temperature.

I have made *post-mortem* examinations of seventeen animals—eleven sheep and six lambs; few of these died in the natural course of the disease, the great majority were killed, some in the earlier, some in the later stages of the illness.

Post-mortem appearances.—1. The constant and most conspicuous pathological feature was the condition of the brain and medulla oblongata. This consisted in great engorgement of the vessels of the pia mater, particularly of the base of the brain and the anterior surface of the medulla; the latter being the more noticeable on account of an almost sharp boundary line between the congested pia mater of the medulla and the normal appearance of that of the adjoining cervical cord. The congestion of the vessels appears, however, limited chiefly to the surface, the cerebral and medullary substance itself not showing anything markedly abnormal in these respects. The congestion of the vessels of the pia mater extends to those of the ependyma of the ventricles. The second conspicuous change consists in an abnormal amount of fluid within the sac of the dura mater, or, more correctly, the subarachnoidal fluid; this fluid, besides being always considerably more abundant than normal, is at the same time more or less blood-stained. In a few cases only the subarachnoidal fluid looks to the naked eye clear and limpid, though under the microscope red blood discs are perceived in it; in most cases the sanguineous character of the fluid is conspicuous to the naked eye, and when examined under the microscope it is found crowded with red blood discs.

2. The change next in importance as regards frequency, concerns the lungs. In sheep in an early stage of the disease the lungs show no conspicuous change, but when the disease is well established the lungs show lobular congestion with petechiæ, which, in the later phases, amounts to (red) consolidation of a large portion of a lobe, most commonly in the middle portion of the lungs. When the disease runs its full course and the animal is examined after death, the consolidation involves the greater part of one lung (middle and lower portion) or even both lungs. Such parts look dark red, are hepatised, and sink in water. On incision they are very juicy and yield much sanguineous fluid. In lambs the lung is always involved; even in cases when the *post-mortem* examination is made a day after the animal showed the first symptom of the disease, one commonly finds the middle

portion of one lung affected, being in a state of extreme congestion and red hepatisation. Pleural fluid, sometimes of a sanguineous character, is present when the lung is involved, and the amount of this exudation is greater the more extensively the lung is affected.

3. A further important change is noticeable in the heart and pericardium. In sheep this condition is always present except in the earliest phases; in lambs it is present only to a small extent, and then only in the well-pronounced and later phases. Amongst the six lambs the cardiac change was absent in two, and was present only to a limited extent in the other four. The change is this: Hæmorrhagic spots, patches and streaks on the endocardium of the right or left ventricle, or both; in some cases the surface of the trabeculæ carneæ being streaked with bloody patches; the auriculo-ventricular valves of the right or left heart, or both, show the same hœmorrhagic patches, and at the same time are slightly swollen; the right auricle is occasionally swollen and glassy-looking in its visceral pericardium of the base of the ventricles.

In sheep in later phases this condition amounts to a conspicuous gelatinous or myxœdematous infiltration; the parietal pericardium in the well-pronounced cases shows this gelatinous infiltration to a remarkable extent, being not merely an œdematous but a true myxœdematous infiltration; the same is the case in the connective tissue between the sternum and pericardium, extending in some pronounced cases through the cervical aperture of the thorax into the deep connective tissue of the neck. The amount of this myxœdematous change of the connective tissue, in the anterior portion of the thoracic cavity, is in some cases so great that the gelatinous material can be taken out almost by handfuls. The myxœdematous condition of the pericardium and mediastinal connective tissue did not occur in any of the lambs. Here only the hæmorrhage into the auriculo-ventricular valves was noticed; but in sheep the myxœdematous infiltration of the base of the ventricles, of the parietal pericardium, and of the mediastinal connective tissue is present in most instances of well-pronounced disease to a greater or lesser degree. The pericardial fluid is increased in amount.

4. The thyroid gland of the adult animal appears of the normal size. In its interior there are white, creamy, grumous masses which, under the microscope, are made up chiefly of scaly epithelial cells. But such creamy masses are present also in normal sheep. As far as the examination of sections of the gland under the microscope goes, the structure of the thyroid appears normal. In the lambs the thyroid appears also of normal size, and in structure shows no change; in one lamb only was the right thyroid reduced in size (to about half that of the left) and showed in its substance what appeared as greyish streaks and patches; under the microscope these greyish portions were loaded with granular masses.

5. The liver shows in some cases congested patches, but in others seems normal.

6. The spleen is small and normal.

7. The stomach and intestines look normal; in lambs the ileum is congested.

8. The kidneys look normal.

9. The blood is normal in its appearance and coagulability; in cases only of pronounced lung disease it is of dark colour.

Summary.—Of all the appearances that I have described, those affecting the brain and the medulla are the only ones which could account for the symptoms observed during life and for the fatal issue. The affection of the lungs, severe only in few cases; and the affection of the pericardium, only in few cases conspicuous and almost absent in lambs, would not produce any notable symptom during life, and could not be the cause of death, so rapid in some cases. The actual changes of the lung and heart observed in lambs are in conspicuous disproportion to the severity of the illness and the fatal issue;

and, similarly, in sheep (except in few cases), the intensity and amount of the lesions in the heart and lung were of such a nature that they could not, in a mechanical way, account for the rapid death. On the other hand, the changes in the brain and medulla are of a nature that, by causing "brain pressure," would be the very conditions which, by their rapid development and rapid increase in intensity, could, by mechanical means alone, readily cause the disease and its speedily fatal issue; an extensive congestion of the vessels of the pia mater setting in suddenly, an acute copious transudation from them, and a consequent rapid increase of the subarachnoidal fluid would, as a matter of course, readily cause those motor disturbances so prominent in this disease; while the increasing pressure on the medulla oblongata might, owing to its secondary effect on the centres of respiration and the cardiac centre, cause the fatal issue.

The primary cause of the disease should then affect, in the first place, the vessels of the pia mater, causing therein an acute congestion, with subsequent exudation and increase of the cerebral fluid. And the question is, "What causes this congestion?" or, in other words, "What is the *causa causans*?"

Etiology.—The consideration of this question brings us to the discussion of the etiology of the disease. There are, in the first place, several points which are well established, and which, by themselves, strongly point to the malady belonging to the class of infectious diseases.

1. The disease has a seasonal and local epidemic character. As is well known, cases of "louping ill" commence during the second half of April; they steadily increase in number towards the middle of May, and then decrease again, so that, by the commencement of June, the disease vanishes for the year. In this respect its similarity to the epidemic and seasonal character of some infectious diseases in man and animals—*e.g.*, cholera and grouse disease—is obvious and striking. As is well known, epidemics of the above diseases commence at a particular season; cases, at first few, gradually increase in number till the climax is reached, and then as gradually diminish so as to again almost completely disappear. With regard also to preference for one locality to another, the "louping ill" partakes of the character of infectious diseases. It is well known that this disease is present only in particular districts in Northumberland and Scotland, is absent from others, and is, as far as I can learn, not known south of Northumberland. Even in districts where the disease prevails, a fence between one sheep farm and the next is, I am informed by experienced farmers, occasionally found to be the boundary between an infected and non-infected area. This same fundamentally important local predilection forms a conspicuous feature in some infectious diseases, both of man and of animals—*e.g.*, cholera.

2. The *causa causans* of the disease is contained on, or in, the soil. In illustration of this there is a well-established fact that if from any farm in which the disease had occurred the animals are removed and a new flock from a non-infected locality brought into the farm, the disease at the proper season will make its appearance amongst the new flock, and, as a rule, to a greater extent than before. The infectious diseases to which similar characters belong are not rare; thus, in anthrax or splenic apoplexy of sheep and cattle, the actual mode in which the animals contract the infection is by receiving the contagion of anthrax from the soil, in and on which it is diffused, and from which, by the respiratory or digestive organs, it is received into the animal. In malarial fever of man (ague) the contagium of the disease lives and thrives in marshy soil, and from here finds its entrance into the respiratory organs and the blood by the instrumentality of the air.

Now, with regard to "louping ill," I learned that it is the almost universal custom that, when an animal dies, its carcase is left on the moors and there rots away till it disappears. Supposing that, as in infectious diseases, the body of

an animal that has succumbed to the disease contains the contagium in an enormous crop of the specific microbes, it is obvious that if such an animal is allowed to remain unburied or unburned, during the dissolution of the carcase numbers of the specific microbes have an opportunity for becoming scattered and distributed over the soil, to remain there ready for new mischief when the favourable time (season) and opportunity (the susceptible animal) offer themselves. Conditions like these would readily account for and explain how the soil of a locality once infected remains a source of infection with great persistence, and also how a locality free from diseased sheep remains free from the infection, while an adjoining farm year after year harbours the disease.

There exists among the farmers and shepherds in the affected districts of Northumberland and elsewhere, a strong, and I may say an almost universal, opinion, shared in by many others who live in the district, that the disease is caused by a true *tick*—a poisonous species of the Arachnida known as the "white tick" as opposed to the ordinary or black sheep tick, and this opinion is founded on the following assertions: (*a*) this "tick" is present where the disease occurs, but (*b*) is absent where there is no disease or where the disease is unknown. About the first, viz., that where there is disease there is also the tick, there can be no doubt; the inspection of the skin (axilla, groin, and thigh) of a diseased sheep or lamb proves this; but I must confess that I have grave doubts as to the correctness of the second, viz., the absence in all cases of the tick from localities where there is no "louping ill," and my doubts will, I am afraid, not grow less strong the greater the confidence with which that assertion is put forth. Unless, and not until, this statement is supported and confirmed by authority, I mean by a zoologist well qualified to give an opinion—until it is really proved that this tick does not exist in localities where the disease does not occur, *e.g.*, on similar moorlands of Yorkshire and Cumberland, I must hold that the conclusion arrived at by the farmers and shepherds and other laymen is based on the well-known fallacy in argument: *post hoc ergo propter hoc*; in other words: "The tick is found in a locality where disease prevails, therefore the tick is the cause of the disease, and therefore where there is no disease there is no tick."

My doubts in this matter are, in the first place, prompted by the remarkable and undeniable fact that the same tick is present in an infected locality on a good many sheep that are, and remain, free from the "louping ill"; this is admitted by the same persons who consider the tick as the primary cause of the disease; and, in the second place, it would be almost short of a marvel that the tick should be present in one farm and, by the farm-boundary—a loose stone fence or less—should be excluded from the next farm, which is free from the disease. I say such an explanation of things seems to me almost impossible of acceptance. There is certainly nothing known in the whole range of epidemic diseases that would offer a similar remarkable condition. An animal that is affected with the disease, as a rule, shows in the axilla or groin or thigh one or two ticks well buried with the head and legs within the skin; in some cases the tick is no longer there, but has left a mark—a blood speck, or a slight pimple—in others it is there, and full of blood which it has sucked up; its body is blackish red, and as large as a medium-sized pea. As far as I can see, all that this tick seems to be doing to its host is that it sucks its blood, and produces locally no more (in fact, less), injury than many other well-known animal parasites. When the tick settles on the skin of a human being, I am told that it *sometimes* produces a conspicuous local irritation with swelling; the only instance in which I had the opportunity of seeing a child that had been bitten some hours previously by this tick, and from whose skin the mother had removed the tick, there was certainly nothing of any local irritation visible. But even assuming that the tick generally produces a local irritation and swelling, this would be no more

than is the case with other skin parasites, particularly those that live on the blood of its host, for it is well known that such parasites secrete into the bite a substance which prevents the blood of the host, at the point of the bite, from coagulating, and thus keeps, as it were, the draught of the blood free by keeping the blood fluid. The undoubted fact, however, mentioned above, and admitted on all sides, viz., that this same tick is found in the skin of animals that are, and remain, free of "louping ill," seems to me to finally dispose of the theory that the tick is the real or proximate cause of the disease, "louping ill." This would still leave open the possibility of the tick being the carrier of infection, inasmuch as it might carry the virus from the soil to the body of the sheep, which, by its bite, it inoculates; but this theory is, it must be confessed, somewhat remote.

3. The disease is apparently communicated from one animal to another. It is well known that if a ewe contracts the disease, her lamb, with few exceptions, also becomes subject to the disease, but a lamb may have the disease without its mother becoming ill. The lamb always follows, and is always in close relationship to, the ewe. Amongst the first signs of illness is this, that the animal is dull, and separates from the rest; now, if the animal happens to be a ewe, it does not matter whether it separates from the rest of the flock or not, its lamb is sure to remain with it, and, therefore, if the disease be of an infectious nature, we should naturally expect that sooner or later the lamb would take the disease from the mother. This is actually of common occurrence. But this would not be the case if the lamb takes the disease first, for then we should find two things happening; first, that the lamb would not or could not follow its mother, consequently the ewe is not so much exposed to infection from its lamb; and secondly, for this reason, that owing to the apparent neglect on the part of the ewe, and for other reasons (be it of charity, or of lucre, or both), the shepherd removes the lamb from the flock, taking it into a shed and nursing it, though, as a rule, this does not avail much.

All these facts taken together would, then, strongly point to the disease being communicable from animal to animal.

Another fact pointing in the same direction is this; that cattle also become affected with the disease, though they, as a rule, recover. I have myself seen at a farm where the disease prevailed amongst sheep, a bullock affected with it; the animal recovered in a day or two, but was distinctly affected; its symptoms were very striking, and as the shepherd graphically described them: "The animal behaved and moved as if it were tipsy." As soon as it showed the disease, it was isolated from the rest of the herd and attended to, and no further case appeared amongst the cattle. It is curious that in the case of this bullock no question of tick was, or could be, put forward, yet this happened on a farm where the disease had been rife amongst the sheep.

There is one other phenomenon which seems to me worth mentioning, although I do not, and indeed I could not at present, until further and more extended observations have confirmed it, put it forward as more than a suggestion. It is this; in all previous years the climax of the epidemic in the farms about Kielder, I am assured, is not reached until the middle of May; this year, however, by May 10th, few, if any, cases were available—the epidemic had practically ceased and run its course on these farms. Now, this year, for the first time, on and after April 27th, *i.e.*, soon after the epidemic commenced, every animal, as soon as it was smitten with the disease, was removed from the rest, and brought down to me for investigation, so that thereby every diseased animal ceased to be a focus of infection to the others. The curious fact that the epidemic had by May 10th already so abated as to be practically over, was admittedly striking; and though the disease did not commence earlier than usual, *i.e.*, about the end of the third week in April, it

nevertheless ceased this year considerably earlier than usual. As I said above, I by no means wish to insist that the immediate removal of the diseased sheep from the rest is the true explanation of the abnormal shortness of the epidemic in these farms, especially as the unusually fine and dry spring may have had something to do with its cessation; but, at any rate, it is highly suggestive, and worth acting on.

I strongly advise action being taken in the future in this direction, viz., as soon as a sheep shows the illness, let it be separated from the rest, and kept isolated in an enclosure for the purpose; no harm can come from this; whereas it may be, as I hope it will, a means of diminishing the number of cases, and of mitigating the epidemic. It could not altogether do away with the disease, for we have pointed out that the cause of the disease, in the first cases at any rate, must be sought in the soil; but it might limit the infection spreading from a diseased animal to the others. The two conditions, viz., the contraction of the disease in the first instance by contagium present and left on, or in the soil by a previous epidemic, and the subsequent spread of the disease from an infected animal to others, are well known to occur in other infectious disorders, both in man and animals.

All these considerations lead us, then, to the conclusion that the disease belongs to the group of infectious or communicable diseases. There can be no doubt that if it can be shown that the growth and multiplication within an affected animal of a particular microbe is intimately associated with the dis ease; if, further, this microbe can be artificially cultivated, and with a trace of such a cultivation, or with the morbid matter from which it is derived, the same disease can, by inoculation, by ingestion, or by inhalation, be reproduced in a susceptible animal, with the multiplication in this experimental animal of the same specific microbe; then the proof has been established that such disease is of the order of the infectious diseases and is caused essentially by that particular microbe. In the case of such disease the early isolation and removal, and the careful destruction, of the affected animals is the surest means of the prevention and spread of the disease. Though this series of proofs is desirable before the problem can be said to be satisfactorily solved, it is not always possible to obtain it. In some of the well-known communicable diseases—*e.g.*, small pox of sheep, small pox of man, hydrophobia or rabies, and others, though these belong to the best known communicable diseases—the *causa causans*, or the specific microbe causing these diseases, has hitherto eluded discovery. Some of the ablest pathologists have in vain searched for it, yet we may take it as a fact that, like other infectious diseases in man and animals in which the search has been successful—*e.g.*, anthrax of sheep and cattle, tuberculosis, swine fever, grouse disease, and a host of others—these diseases must be caused by living, self-multiplying microbes.

I have therefore directed my particular attention to investigating in this direction the various diseased organs in the sheep affected with, or dead from "louping ill." The result of this part of the investigation is the following:—

1. The blood was examined in all cases in the fresh state, and after the usual methods of preparation by staining, but no extraneous particulate matter, and no microbes, could be detected. Cultivations made from the heart's blood, and duly incubated, remained free from any growth. So that no microbes were to be detected in the blood by the known methods of examination.

2. The examination of the cerebral fluid microscopically and culturally, yielded in six out of the seventeen cases positive results, inasmuch as under the microscope, and particularly by cultivation in these six cases, one and the same definite species of bacillus was detected. This, in specimens prepared after the usual methods of making coverglass specimens (drying a thin film on a thin coverglass, staining and mounting this), a few short bacilli singly and in dumb bells could be detected; and in cultivations made on the surface of

nutrient gelatine and nutrient agar—by rubbing a drop of the cerebral fluid over the surface of these media by means of a sterile platinum loop—colonies came up when these were incubated respectively at about 20° C. (=68° F.), and at 35–37° C. (=95–99° F.). In two cases the number of the colonies was considerable; in the other four there were in each tube two or three colonies of this species. By saying that in six cases the cerebral fluid yielded colonies of one species, I ought to add that in some of these cases, as well as in others, from a drop of the cerebral fluid in one or the other culture tube (there were in each case at least three gelatine and three agar cultures made), one colony of a different species of bacteria was obtained. But these other species were not the same in any two cases, and owing, therefore, to their scarcity and to their exceptional appearance, they may be at once dismissed as accidental contaminations; that is to say, as introduced in the process of preparing the cultivations. But the above species that occurred in the six cases was uniformly present, and, besides, was in the case of two of the animals very abundantly present in each culture tube.

The colonies of this species are round, somewhat raised above the surface of the nutritive medium. They appear only slowly on gelatine, being three to four days before they are sufficiently developed to be seen with the naked eye; but on agar incubated at 35–37° C. they are noticeable by the second or third day. The colonies are *of a distinctly yellowish aspect* when looked at in reflected light, but when seen in transmitted light are brown.

In streak-culture they form a yellowish band-like growth in the line of the streak, which at first is greyish and narrow, gradually as growth proceeds becoming broader and of a yellowish colour. The outline is knobbed or crenated, thinner at the margin, thicker in the middle. When this band has been growing for some time—one to two weeks—on gelatine, it looks moist and markedly yellow in the thicker parts. Later on the edge becomes filmy and slightly corrugated. In stab-culture the line of the stab becomes marked as a linear aggregation of greyish round droplets, brown in transmitted light. On the surface of the stab there is, after some days, a slightly prominent yellow knob; at first very limited, but gradually spreading out into a patch-like yellow mass. The gelatine is not liquefied. Milk is not coagulated by the growth of the microbe.

Faintly alkaline broth becomes, by the growth of this organism, turbid in a couple of days; later the broth shows a fairly copious floccular greyish precipitate.

Examined under the microscope, the growth is composed of minute non-motile rods or bacilli; short ovals to fairly long rods, measuring on the average 0·6–0·8–1 μ* in length, 0·2–0·3 μ in thickness. As a rule the ovals and rods form dumb-bells; the individual elements are sometimes almost spherical, in most instances, however, distinctly ovoid. I have tried inoculation with material from cultures of these bacilli on rabbits, guinea-pigs, and mice. The result of these is as follows:—Injecting a fair dose of the growth (gelatine or broth cultivation) into the subcutaneous tissue, a swelling is produced which, after 48–72 hours, becomes very marked; then it diminishes, becoming at the same time firm. Constitutionally no abnormal symptom is produced; the animals remain lively and continue to feed well. This practically negative result cannot, however, be accepted as indicating that the bacillus is not directly concerned with the disease of the sheep, since the rodents experimented upon need not be, and probably are not, susceptible to the "louping ill."

3. In the heart and pericardium, including the gelatinous infiltration, no microbes could be demonstrated, either by the microscope or by cultivation.

* A μ is $\frac{1}{25000}$ of an inch.

4. In the thyroid gland no microbes could be demonstrated, except in one case where several colonies of a gelatine-liquefying coccus—a form of sarcina were obtained in one out of several culture tubes. In microscopic specimens of the fresh thyroid of this same case, a few examples of dumb-bell- and sarcina-like cocci were also demonstrable.

5. From the diseased portions of the lung the same short bacillus that had been found in the cerebral fluid was also obtained in two cases. It formed a yellowish growth, not liquefying the gelatine. In each of the cases in question considerable portions of the lung were involved, and in the cover-glass specimens made of the fresh lung in these cases numerous examples of these short bacilli were demonstrable.

In the remaining cases, a few colonies of other and different species (longish motile bacilli, cocci, or short motile bacilli resembling the *Bacillus coli*) were obtained by culture from the diseased portions of the lung. These microbes, however, owing to their great scarcity in cultivation, and to the fact that each was only exceptionally found, may be dismissed as accidental contaminations.

We arrive, then, at the conclusion that the only microbe which has any claim—small, I admit—to be considered as in any way causally related to the "louping ill" disease, is the small bacillus described above. This was cultivated from the cerebral fluid of six cases, and in addition from the lung of two of them. In two of the six cases the microbe was recovered from the cerebral fluid in such numerous colonies that it seems very probable that it has an important bearing on the causation of the disease; for it can hardly be assumed that a microbe, numerously present in the cerebral fluid, could be merely an accident. That this same microbe was not demonstrated by cultivation in eleven cases is, I admit, an argument against its being the specific microbe of the disease; but it has to be remembered that most of these cases were sheep or lambs that were killed in an early phase of the disease, and that for each cultivation tube only a small drop, or a fraction of a drop, of the cerebral fluid was used; so that it remains quite possible that in the early phase of the disease the microbe is not yet abundantly present in the cerebral fluid.

But the *argumentum crucis* is whether or not this short bacillus, when introduced in one way or another into the normal sheep, is capable of producing the disease. As to this, I inoculated subcutaneously two lambs with the cerebral fluid of a sheep killed in an early phase of the disease; but the fluid had been kept in sealed tubes about a week prior to its being used. The lambs in question seemed a little quiet after 48 hours, but continued to feed and then became again normal.

Two lambs were next inoculated subcutaneously in the groin with a culture of the suspected bacillus. After one to two days they showed about the seat of the inoculation redness of the skin and a slight swelling in the subcutaneous tissue; the animals were at the same time quiet and did not feed well. But after the end of three days they were again lively and fed well, and of the swelling very little could then be noticed. By the end of five days they seemed in all respects normal. From this it would appear that by subcutaneous injection of the microbe no definite disease is producible.

E. KLEIN.

WORM DISEASES IN SHEEP AND OXEN IN QUEENSLAND.

LAST year Mr. J. Irving, Government Veterinary Surgeon, made a report to the Chief Inspector of Stock concerning a *post-mortem* examination held on thirty sheep received into the quarantine grounds from the Darling Downs for the purpose of testing the relative efficacy of several worm drenches On that occasion Mr. Irving reported specially on a nodular disease of the intestines, which was more or less present in each of the sheep examined. Some

of the sheepowners in the district from which these sheep were procured, stated that they had been familiar with the disease in question for years, but were of opinion that it did not affect the health of the sheep. Dr. T. L. Bancroft has forwarded a letter on the subject to the Chief Inspector of Stock, Mr. P. R. Gordon, who, in submitting it to the Colonial Secretary, has taken the opportunity of acknowledging the valuable assistance which Dr. Bancroft has cheerfully and gratuitously given him in matters of importance to stock-owners :—

"For the information of some of your correspondents, I have written the following short account on the nodular intestinal disease of sheep and oxen, together with particulars of a scheme for freeing the country of worm parasites. The nodular disease was at one time regarded here by veterinarians as a form of actinomycosis, but by microscopical examination I had convinced myself some years ago that it was neither that disease nor tuberculosis. Had I at that time examined the nodules on the mesentery and omentum, in which the embryos of *Œsophagostoma* are always to be found, instead of contenting myself with the examination of the intestinal ones alone, which are, as a rule, full of caseous material and free from parasites, I could not fail to have discovered the true cause of the disease. However, upon the publication of Dr. Curtice's work on the parasites of sheep ("The Animal Parasites of Sheep"), in which the nodular condition is carefully described and shown to be due to a worm parasite, the *Œsophagostoma*, we were all made acquainted with the true nature of the disease. This parasite, which is perhaps the worst of the intestinal worms of sheep, appears to be spreading in this and the adjoining colony; yet there are still many runs which remain free from it. My attention was drawn to the fact whilst at Lake's Creek last year, that one batch of sheep, some thousands, would be found affected by the *Œsophagostoma*, whereas not one individual of another lot would have the disease, demonstrating in a remarkable manner that some runs are badly affected whilst others are free. Some of your correspondents appear to be unaware that the intestine performs a most important function—that of absorbing the digested food. Every portion of the mucous surface injured by the parasite—and the whole of these injured portions in a bad case might amount in the aggregate to one-twentieth of the absorbing surface—means that the sheep is losing nutriment and must, even were it able to keep up condition, eat very much more than a sound sheep would have to eat. The worm parasites of sheep, fluke and lung worms included, are propagated by means of eggs, which pass out with the excrement or otherwise, and eventually find their way into water. The water acts as a medium through which they gain entrance again to other animals. Now it follows that if sheep could be supplied with pure water they would never become infested I have often thought that squatters might gradually free their runs from parasites in the following manner :—Fence off a portion of the run, into which put horses only; fence off all the swamps, waterholes, and creeks; erect windmills to pump the drinking water into troughs. After one year has elapsed remove the horses and stock with sound sheep. Operate now on a second portion, and so on. Undoubtedly the fencing and windmill would be expensive. Still, I am of opinion it would ultimately pay to do it. The rationale of the method is—1. That the parasites of horses, with one doubtful exception, the lung worm *(Strongylus micrurus)*, do not live in sheep, and that the part of the run under operation need not remain unoccupied. 2. During the year the eggs of the sheep-worms which have already been distributed all over the area, would perish or be washed into deep water, where they would be out of harm. 3. The new stock of sheep being free or practically free from parasites drinking at the troughs of water would remain uninfested. If this method could not be adopted on account of the expense the following one might add greatly towards the same end :—Fence off all swamps

or drain them; deepen out the waterholes, especially at the places where the sheep drink. In deep water the parasites would have very little chance again of entering sheep, for the eggs and embryos lie at the bottom. It is in shallow swampy water where the danger is so great of their being sucked up with dirt from the bottom. It must be remembered that overstocking increases parasitism, not alone from the causes previously mentioned, but by necessitating the animals to bite close to the ground and to eat food soiled by excrement."

EXPERIMENTAL IMMUNITY AGAINST INFLUENZA.

BRUSCHETTINI (*Rif. Med.*, July 16th 1893) returns once more to this subject. In previous papers he demonstrated a pathogenic action of the B. influenzæ on animals. He found the rabbit very sensitive to this infection, and was able to ascertain conditions under which this animal could be infected at will, either with a slight transitory affection or with a grave fatal disease. He showed that these two types corresponded closely to the varying forms of the disease in the human subject, both in clinical course and pathological effects. He next attacked the subject of artificial immunity, dividing his researches into three series. He sought first to vaccinate animals against the infection; having succeeded in this, he tried whether immunity could be conveyed from a vaccinated to an unvaccinated animal by injections of the serum derived from the former; finally, with the serum he has tried not only to prevent, but to cure the already established disease. In all these points he has met with success, and his conclusions may be summarised as follows: (1) The rabbit may be without difficulty vaccinated against the effect of cultures of the influenza bacillus. (2) The material best suited for the vaccination, in that it gives the highest grade of immunity, is obtained by filtering serum cultures of the bacillus through Berkefeld filters. (3) The serum of animals thus vaccinated possesses a marked antitoxic but no bactericidal power. (4) This serum also possesses the property of conferring on other animals immunity both against the infection and intoxication produced by cultures of the bacillus. This property is so powerful that injections of the serum in the proportion of 1–42000th of the body weight suffice to induce immunity, or perhaps even less. (5) The serum has also a marked curative action, reducing the temperature of already affected animals, and preventing an otherwise certainly fatal issue.—*British Medical Journal.*

RABIES IN SOUTH AFRICA.

THE outbreak of rabies in the Cape Colony has led to orders being issued with the view of suppressing the disease, as well as information and notes of warning which appeared in the *Government Gazette* of September 1st, as follows:—

"The recent lamentable case of hydrophobia at Port Elizabeth, and the spread of rabies to fresh centres of Graham's Town and Steytlerville, point to the importance of the warning issued under Government Notice No. 548, of the 18th May, 1893, and to the necessity, not only for keeping a careful watch for any unusual symptoms in dogs, but also for having all dogs under control as far as possible

"Divisional Councils, Municipalities, and Village Management Boards are accordingly earnestly invited to give their attention to this matter, which from the great danger to human life, may prove to be one of the first public importance.

"Considerable support can be given by local bodies in the attainment of this object if they will exercise their powers of imposing a tax upon dogs, since the law authorises the destruction of dogs found without a licence in

localities where this tax is imposed; and divisional councils are especially reminded of the provisions in this behalf contained in Act No. 14 of 1884.

"The powers for the destruction of unlicensed dogs are given by Act No. 15 of 1885, to justices of the peace, field-cornets, constables, and other officers of the peace and owners and occupiers of land.

"In localities where rabies actually breaks out, the provisions of the Rabies Act will at once be put into force; but considerations of the public safety demand that every effort should meanwhile be made to prevent the further spread of the disease and creation of fresh centres; and a material aid in this object will be afforded if Divisional Councils, Municipalities and Village Management Boards, will make use of the legal provisions to which attention is drawn.

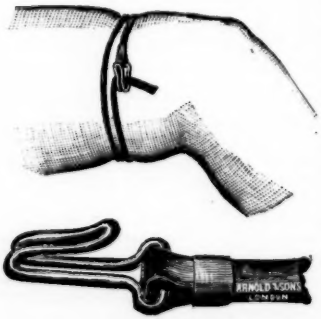
"It should be noted that the disease affects not only dogs, but also cats, monkeys, and other small animals, as well as horses, cattle and sheep, although it is by the dog that it is most commonly communicated to human beings.

"All owners of dogs are reminded that animals exhibited at the recent show at Port Elizabeth, or which have recently come from Port Elizabeth, may have contracted the above disease while there, and that it is necessary, in the interest of the public, to keep a careful watch on all dogs with a view to noting any unnatural or unusual symptoms which may manifest themselves.

Upon the advice of the Colonial Veterinary Surgeon and the Colonial Bacteriologist, it is recommended that the wounds of any persons who may be bitten by rabid dogs should be freely cauterized with carbolic acid of the strength of one part of the acid dissolved in seven parts of glycerine."

The Colonial Veterinary Surgeon states that the majority of the cases which have occurred at Port Elizabeth have assumed the dumb and lethargic forms of the disease, in which the irritable or furious stage lasted but a comparatively short time, about twenty-four to forty-eight hours, after which the dogs became dull, morose, and depressed-looking, and very soon passed into a state of coma, in which they remained from twenty-four to thirty-six hours before they died—their death being apparently perfectly painless, and without a struggle.

"RELIANCE" TOURNIQUET FOR BLOODLESS OPERATIONS.



Messrs. Arnold and Sons, of West Smithfield, have introduced a new form of grip or fastening for an elastic tourniquet, for which a patent has been applied. It is very simple, light and inexpensive, made in the form of a hook, but tapering towards the end, with an indiarubber ring for attachment. It can be secured or released instantaneously. By simply placing the tubing in the hook, it is held firmly and securely, and by a gentle outward pull it can be immediately released.

This form of tourniquet is so simple in its fastening that it can be immediately applied by inexperienced hands; on this account it is so strongly recommended.

CAPPED HOCKS AND ELBOWS.

M. WEBER, Veterinary-surgeon in Paris, has been successfully employing the following ointment in the cure of capped hocks and elbows:—

Norway (Stockholm) Tar	45 parts.
Soft Soap	45 parts.
Sifted Tan Powder	10 parts.

In the *Presse Vétérinaire* for September 30th, M. Caleb states that he has also obtained favourable results from its use.

Army Veterinary Department.

Gazette, October 3rd.

Veterinary-Lieutenant R. W. Raymond to be Veterinary-Captain.

Gazette, October 17th.

1st Lincolnshire (Western Division) Royal Artillery.—Second Lieutenant W. G. Burnett Dickinson is appointed Veterinary-Lieutenant.

Veterinary-Major F. F. Crawford embarked, on the 29th September, for a tour of service in India.

The following movements of veterinary officers will take effect on October 1st:—Veterinary-Major J. Hammond, Canterbury to Chatham; Veterinary-Major S. M. Wilson, Woolwich to Exeter; Veterinary-Major B. A. W. Powell, Chatham to Dorchester; Veterinary-Captain R. H. Ringe, Exeter to Aldershot; Veterinary-Captain J. B. Savage, Aldershot to Canterbury.

Obituary.

THE death has been reported of Mr. B. A. Clancy, M.R.C.V.S., The Curragh, Ireland, who graduated in 1883; also that of J. Dulley, M.R.C.V.S., a graduate of 1858.

Proceedings of the Royal College of Veterinary Surgeons and Veterinary Medical Societies, etc.

ROYAL COLLEGE OF VETERINARY SURGEONS.

QUARTERLY MEETING OF COUNCIL, HELD OCTOBER 19TH.

F. W. WRAGG, Esq., President, in the chair.

Present:—Professors Edgar, J. McFadyean, Penberthy, E. S. Shave, T. Walley; General Sir F. Fitzwygram, Veterinary-Captain Raymond; Messrs. J. D. Barford, Jos. Donald, G. Elphick, Edwin Faulkner, J. Fraser, Charles Hartley, H. Hunter, Wm. Hunting, H. Kidd, Alex. Lawson, A. W. Mason, T. H. Merrick, W. J. Mulvey, J. E. Peele, J. F. Simpson, R. C. Trigger, A. W. Wheatley, Geo. Thatcher (Solicitor), and A. W. Hill (Secretary).

The SECRETARY announced the receipt of letters, regretting their inability to attend, from Professor McCall and Messrs. Hedley and Nisbet.

The SECRETARY reported the following presentations to the library:—The fifth volume of the *Veterinary Record* by the editor; a copy of the "Annual Report" by Professor Brown of the Veterinary Department of the Board of Agriculture, General Report of the Army Veterinary Department, by Colonel Lambert, C.B., and to the Museum a Foal Fœtus, presented by Mr. W. Buckeridge, of Hungerford, Berkshire, and a Thrombus taken from the portal vein of a cob six years of age, presented by Mr. H. Kidd, of Accrington.

Mr. MASON moved, and Mr. MULVEY seconded, a vote of thanks to the donors, which was carried unanimously.

The report of the special general meeting in regard to the registration of farriers and shoeing-smiths by the Worshipful Company of Farriers was then laid on the table.

Mr. MERRICK proposed that the report be taken as read.

Mr. SIMPSON seconded the motion. He presumed that the recommendation of the special general meeting was all that the Council wished to know.

The SECRETARY then read the resolution as passed:—"That this meeting call upon the Council of the Royal College of Veterinary Surgeons to sever its connection with the Registration Committee for the National Registration of Shoeing Smiths.' There were thirty members present, eighteen of whom voted for the resolution and twelve against.

Professor WALLEY thought that the majority was so small that it was questionable whether the Council should adopt a resolution of that kind.

The PRESIDENT, in reply to Mr. Mulvey, said that the cost of the meeting to the College was about £17,

On the motion of Mr. FRASER, seconded by Mr. MERRICK, it was resolved to proceed with the next business.

The SECRETARY read the report of the meeting of the Finance Committee, held on the previous day, which stated that, from the quarterly statement, it appeared the present liabilities of the College were £184 13*s.* 4*d.* The Committee recommended that those liabilities should be discharged, leaving a balance at the bankers of £815 3*s.* 5*d.* It further stated that the committee at the last meeting had recommended that copies of the Register, similar to those issued in 1889, should be sent to the clerks of the various County Councils, to the Town Clerks, and Clerks of the Peace thoroughout the kingdom; but, as it was estimated that the cost would be £50, the President had ordered the matter to stand over. The committee now recommended that this resolution regarding the issue of the copies of the Register should be annulled on account of the expense, but that any one of the County Councils or other Local Authorities might be supplied with a copy on application free of charge.

Mr. MERRICK, speaking as an inspector, said that members of the County Councils always had the free use of his register on application.

Sir FREDERICK FITZWYGRAM thought it would be sufficient if a copy of the register were sent to each County Council. It was of great importance to the profession that the County Councils should have registers of qualified men, especially as these Councils had superseded all other authorities. The Clerks of the Peace would only act under the County Councils, which were the ruling authorities in the country. He moved, as an amendment, that a copy of the register be sent to each County Council. He was informed that that would only involve the issue of sixty copies.

Mr. HARTLEY seconded the amendment.

Mr. KIDD asked Sir Frederick to include in his motion the Town Clerks, especially in the large cities, because County Councils had very little control over them.

Mr. SIMPSON said that he had never been made aware that any very great advantage would be derived from incurring the expense involved. The Committee fully thrashed out the subject, and came to the conclusion that it was unnecessary. He thought that the addition to the recommendation that was made that any clerk to a Local Authority could have a register on applying for it was sufficient. He therefore moved the adoption of the report.

Mr. MASON seconded the motion.

The amendment was then put to the Council and lost, six voting in its favour and eleven against. The motion for the adoption of the report, including the signing of cheques to meet liabilities, was then agreed to.

The SECRETARY read the report of the Examination Committee, which, on the motion of Mr. TRIGGER, seconded by Mr. MERRICK, was referred back to the Examination Committee.

The SECRETARY reported that the Registration Committee had recommended certain prosecutions, and that in other cases notices should be sent.

On the motion of Mr. SIMPSON, seconded by Mr. MASON, the report was received and adopted, and the seal of the College was ordered to be attached to the necessary instructions to the solicitor to prosecute.

Professor MCFADYEAN moved, Mr. MULVEY seconded, and it was resolved—"That the date of the next written examinations be the 11th December, and that the oral examinations be held in London on the following day."

Veterinary-Captain RAYMOND then moved—"That steps be taken to obtain for members of the Royal College of Veterinary Surgeons in the colonies (except Canada) and India similar privileges to those conferred by the Veterinary Surgeons Act of 1881 upon members of the Royal College of Veterinary Surgeons at home." At present members of the College in the colonies were upon exactly the same footing as quacks. He had received a number of letters from the West Indies, from the Indian veterinary surgeons, from Durban, from two parts of New Zealand, and a petition from Mauritius. He had not written to Australia, because they had a college there, and he did not quite know how to approach them, but he had seen a gentleman on the Council of the Australian College, and gathered from his conversation that the members of the profession practising in Australia would be very glad if something were done to assist them, because they were also overrun with quacks. He had made some inquiries at the Colonial Office with regard to the best way of carrying out the resolution should it be passed, and was informed that there were two ways in which it could be managed. They could either attack the colonial legislatures in each colony directly, or write to Lord Ripon, who, if the case were put to his satisfaction, would forward it to the different colonies with his support. Later on, if they were successful with the Crown colonies, it might be possible to attack Australia and Canada, which would be rather more difficult. In order to do that it would be necessary to have the support of the local colleges. As they were equally the victims of quackery with the English college, he thought they would probably be only too glad to have its powerful assistance in the matter. In answer to Professor Walley, he said he would except Australia for the moment, but he was completely in the hands of the Council. He had put his resolution vaguely, and would be only too glad to adopt any suggestion, provided that it did not annihilate the sense of his motion.

Professor WALLEY said he had asked because there was a college in Australia, and he did not know whether its graduates were recognised out there as English graduates were here. If they were equally recognised, it would follow that the Australian colonies would expect the English college to allow their men to practise here.

Veterinary-Captain RAYMOND acknowledged that Canada and Australia were difficult points in the question, and he was quite willing to withdraw Australia if thought desirable by the Council. With regard to India, in answer to Professor Edgar, he said he had received a letter from a gentleman who had considerable control over the College, who had spontaneously written to him, hoping that his motion would also extend to India.

Mr. MERRICK, as an ex-colonial veterinary surgeon, endorsed what Captain Raymond had said about the difficulties that members of the Royal College of Veterinary Surgeons have out in the colonies, especially with regard to South Africa. Veterinary surgeons in Cape Colony could not live unless they were subsidised by the Government. He did not see, however, how the steps which Captain Raymond proposed were to be taken.

Professor WALLEY said he would second the motion on the understanding that Captain Raymond exempted Australia as well as Canada.

Professor PENBERTHY asked if the power could be acquired in any other way except by Act of Parliament, and whether it was at all likely that an Act of Parliament would be passed which would affect such an infinitesimal minority as the members of the Royal College of Veterinary Surgeons in the colonies and foreign possessions.

Veterinary-Captain RAYMOND suggested that they should not act on the colonies through an Act of Parliament passed through our legislature. It would be a most expensive matter, even if it could be done. He had pointed out two ways in which they could move in the matter. "Similar" privileges to those which English practitioners enjoyed could be obtained through the local legislatures, as he had been informed by the adviser at the Colonial Office.

Professor PENBERTHY asked what compulsory treatment could be brought to bear upon the quacks.

Veterinary-Captain RAYMOND suggested that the matter should be referred to a committee provided that the drift of his motion were recognised.

Mr. SIMPSON feared that no good was likely to come of the proposal, but he was quite willing to vote in favour of its being referred to a committee.

Mr. TRIGGER moved—"That this Council recognises the desirability of Captain Raymond's resolution, if practicable, and hereby appoints a small committee to consider it and report to this Council."

Mr. SIMPSON seconded the motion.

Veterinary-Captain RAYMOND suggested that the committee should have power to draw up a memorial to the Colonial Office, and to make enquiries, so as to be able to put the matter before the Council in its proper light.

Mr. TRIGGER agreed to the suggestion, so long as the committee did not commit the Council to any action in the matter.

Mr. HUNTING thought that the words "if practicable" were a reflection upon the judgment and intention of the Council, and suggested that they should be struck out.

Mr. TRIGGER having agreed to the omission, his resolution, with the words "if practicable" struck out, was then carried.

On the motion of Mr. TRIGGER, seconded by Mr. SIMPSON, the following gentlemen were elected as members of the Committee:—Professor Penberthy, General Sir Frederick Fitzwygram, Veterinary-Captain Raymond, Mr. Hunting, Mr. Mulvey, Mr. Simpson, and Mr. Trigger.

Mr. HUNTING moved:—"1. That all resolutions now in force relating to the Library be repealed, and that the Library Committee be empowered to draw up rules permitting the use of the books and documents contained therein." "2. That all books and documents in the Library not catalogued, or which may be considered superfluous by the Library Committee, be disposed of."

Professor WALLEY seconded the motion.

An amendment was proposed by Mr. MASON:—"That the motion be referred to the Libraries Committee and acted upon if necessary," and was seconded by Mr. MERRICK, but was subsequently withdrawn.

The motion was agreed to.

Mr. SIMPSON gave notice that in due course he would move the followiug alteration of bye-law:—"That no student shall be entitled to receive the diploma or to have his name entered in the Register of the Royal College until he has completed his twenty-first year, but he may present himself for his final examination provided he would complete his twenty-first year before the date of the next examination."

Professor EDGAR gave notice that in due course he would move an altera-

tion of Regulation 8 for professional examinations:—"That numbers be substituted for the terms 'very good,' 'good,' 'sufficient,' and 'bad.'"

The SECRETARY read the obituary list as follows:—Nicholas Doyle, of Wexford; John Burnett, of Maybole, Ayrshire; George Brame, of Rothwell, Leeds; Walter Lodge, of Dewsbury; J. F. Thompson, of Eyre Street, Sheffield; B. A. Clancy, The Curragh, Ireland; and Joseph Dalley, of Wellingborough.

Professor WALLEY proposed that a vote of condolence from the Council should be sent to the widow of Mr. Burnett, he having been a member of the Council.

Mr. HUNTER seconded the motion, which was agreed to.

This concluded the business of the ordinary meeting.

SPECIAL MEETING.

The PRESIDENT stated that the object of the special meeting was to consider alterations of the bye-laws and regulations.

Mr. MULVEY moved:—"That no student shall be eligible for the first examination until he has attended at least one session at the same college or school, the session to consist of three terms of not less than ten weeks each." He did so for the following reasons. In the bye-laws the word "term" was used, but there was no definition as to what length of time that term should be. It was advisable that the schools should know exactly how long the college expected the students to be under their care.

Mr. MERRICK seconded the motion.

Professor WALLEY pointed out that the schools themselves were not the judges and regulators of what should constitute a term. The Council had decided that the year should be divided into three terms, viz., two winter and one summer, each winter term to consist of not less than eleven weeks and the summer term not less than eight weeks. That was distinctly passed by the college when the summer session was introduced, and it had never been rescinded. As to whether it appeared in the regulations or not he did not pretend to say.

Mr. MULVEY said that, as a matter of fact, it did not appear there, and it ought to do so. If the Council would allow him he would somewhat alter the wording of the resolution, and substitute—"That the session shall consist of thirty weeks," leaving it to the schools to divide it as they pleased.

Professor MCFADYEAN moved as an amendment that the alteration be in the following words—"That no student shall be eligible for the first examination until he has attended one session of not less than thirty weeks, exclusive of holidays, at the same college or school."

Mr. SIMPSON seconded the amendment.

The amendment was then put and carried, and on being put as a substantive motion it was also agreed to.

Mr. MULVEY then moved Clause 2—"That no student shall be eligible for the second examination until he has attended at least one session of thirty weeks after passing the first examination."

Mr. TRIGGER seconded the motion.

Professor MCFADYEAN moved as an amendment—"That for Rule 14, on page 73, the following be substituted—'That no student shall be eligible for the second examination until he has attended two sessions of not less than thirty weeks each, exclusive of holidays, at the same college or school.'"

Mr. HUNTING objected that the amendment could not be moved without three months' notice being given, seeing that it dealt with a question of principle.

Professor WALLEY seconded the amendment. He had long held that it was a great hardship upon a student if, after having passed in two subjects, and

being rejected in one, he was kept back for a whole year before he could again present himself for examination.

Professor PENBERTHY said in his view if a man had not sufficient ability to pass the first examination it would not do him any harm to have a little longer for the next.

Mr. TRIGGER having urged that the amendment was one requiring notice,

The PRESIDENT said he was advised by the solicitor that the amendment was in order.

Mr. HUNTING asked the solicitor how it was that an amendment to the bye-laws, of which notice had been suspended for three months, could now be altered and a new principle introduced.

Mr. THATCHER said in his opinion it was not introducing a new principle, and that Professor McFadyean's amendment was all in the spirit of the resolution.

The amendment was then put to the Council and was carried by 10 to 9. On a division being called for by Mr. Mulvey the PRESIDENT declared that 11 were in favour of the amendment and 10 against. The amendment was therefore carried.

Veterinary-Captain RAYMOND moved, and Mr. TRIGGER seconded, that the names of those voting should be taken down.

An amendment to this, moved by Professor WALLEY, seconded by Mr. SIMPSON, "That the Council proceed to the next business," was carried by 12 to 5.

On Professor McFadyean's amendment being put as a substantive motion, 9 voted for, and 10 against. The motion was therefore lost.

Professor WALLEY asked what was the result of that waste of time.

Mr. THATCHER said the result was that Mr. Mulvey's original proposition and Professor McFadyean's amendment were both annulled. The whole thing fell to the ground.

Mr. MULVEY said under the circumstances he would leave the matter as it stood and give notice that at the next meeting he would propose Clauses 2 and 3.

Mr. HUNTING moved—"That Bye-law 35 be suspended in relation to Mr. Evander Brown, so as to permit him to be examined for his diploma at Christmas next instead of in May." He explained that Mr. Brown had come over to England holding the diploma of the Bombay Veterinary School, and was under the impression that he would, therefore, be let off his attendance at college for one session. His reason for believing so was that a custom, although an illegal one, had been in vogue some years of permitting men holding a doctor's degree or other veterinary degrees to have only two sessions instead of three, and to go up for their second and third examinations. Mr. Brown did not wish to avoid any of his examinations, but if he were not permitted to go up at Christmas he would be too old to go into the army. Professor Steel had unfortunately given Mr. Brown to understand that he would be allowed to go up for his diploma in two examinations instead of three. Mr. Brown had obtained his diploma at Bombay with honours; he had taken his class prizes, and had not failed in anything he had attempted since he visited the Camden School. All he asked was that the regulations should be suspended, so as to enable him to go up some few months earlier than he would otherwise be permitted to do.

Professor MCFADYEAN seconded the motion.

Mr. TRIGGER said that when he first saw the resolution he looked upon it as a dangerous precedent, but after the explanation given by Mr. Hunting he should not oppose the motion.

Professor EDGAR submitted that the Council had no right to allow sentiment to overrule principle. He sympathised very deeply with Mr. Brown, but if

concessions were made for every individual who happened to find himself in an unfortunate position it would be opening the door a great deal too wide. They had no right to alter the fundamental laws of the college for the sake of individuals.

Mr. MULVEY said there was a power in the hands of the Director-General of modifying the rule as to age for entering the army.

Mr. SIMPSON said Mr. Brown's best plan would be to memorialise the War Office in order to make an exception in his case.

Mr. TRIGGER thought that as the army law was not unalterable, the leniency should come from the War Office and not from the college.

The motion was then put to the Council and lost, only three hands being held up in its favour.

Professor PENBERTHY said that owing to some change in arrangements they found themselves without Fellowship examiners. Bye-law 39 said—"That in the month of July the Council shall appoint a special Court of Examiners," &c. In order to make it possible for them to elect Fellowship examiners it was necessary that the bye-law should be suspended. He therefore proposed:—"That Bye-law 39 be suspended for the purpose of election of examiners for the Fellowship Degree." It was highly necessary that they should proceed immediately with the election.

Mr. LAWSON seconded the motion.

Mr. SIMPSON thought it should be stated for what length of time the bye-law should be suspended.

Mr. MULVEY said that, to put it in order, he would propose as an amendment—"That Bye-law 39 be suspended for six months for the purpose of election of examiners for the Fellowship Degree."

Mr. SIMPSON seconded the amendment, which Professor PENBERTHY agreed to accept.

The amendment was then agreed to, and carried.

The PRESIDENT said that as a special meeting would be required within fourteen days to confirm the alterations in the bye-laws, he proposed to bring on the election of the Fellowship examiners at a meeting immediately after that special meeting.

At the request of Mr. SIMPSON the names of the gentlemen already nominated were read as follows:

Professor Macqueen nominated by Professor Edgar.
Professor Duguid nominated by Professor Edgar.
Dr. Fleming nominated by J. F. Simpson.
Professor Woodroffe Hill nominated by Professor Axe and J. Roalfe Cox.
Professor Axe nominated by W. J. Mulvey.
Captain Smith nominated by W. J. Mulvey.
Professor Pritchard nominated by J. R. Cox.
Mr. Finlay Dun nominated by J. A. Dollar.

Professor PENBERTHY asked if there was any objection to nominating additional candidates.

The PRESIDENT said it had been advertised that the lists would be closed on the 31st inst. If any other names were sent he would submit them to the Council.

Professor PENBERTHY suggested it should be advertised again. He wished to nominate somebody, and should not do so unless the whole profession had an equal right with himself.

The SOLICITOR (Mr. THATCHER) said that the bye-law stated that every candidate for the place of examiner must be nominated in writing to the Secretary at least fourteen days before the election took place.

Professor WALLEY said that if the election was to be within fourteen days it was too late to advertise again.

The PRESIDENT said they had eight candidates. It had been advertised in one periodical for four weeks, and that was the result of the advertisement in a paper having "the largest circulation in the profession."

Mr. TRIGGER thought the election could best be taken at the next quarterly meeting. There would be no hardship, because until the new Fellowship examiners were appointed the old ones would remain in office.

Mr. HUNTING thought the sooner the examiners were re-appointed the better.

Professor PENBERTHY proposed that the election be deferred to the next quarterly meeting. The secretary informed him that he had only two applicants for the Fellowship degree and a third uncertain one, and the examination could not be held until he had four. He thought these men would not be sorry to have another three months for study.

Mr. THATCHER suggested that before any resolution of the kind was proposed it would be as well to look at the regulation which had been passed by the Council with regard to the Fellowship examinations. It ran thus—"There shall be at least two examinations held during the year, in the months of May and December."

The subject then dropped.

On the motion of Mr. MULVEY, seconded by Professor WALLEY, a vote of thanks was passed to the Chairman, and the Council adjourned.

THE CENTRAL VETERINARY MEDICAL SOCIETY.

THE annual general meeting of this Society was held on October 5th, at the Royal College of Veterinary Surgeons, Mr. Roots, President, in the chair. There were present Messrs. A. Butters, F. C. Mahon, A. Gostling, R. Butler, J. S. Hurndall, F. R. Ingersoll, Professor Pritchard, A. Prudames, F. W. Wragg, J. A. W. Dollar, Professor Penberthy, A. Rogerson, W. J. Mulvey, W. J. Arkcoll, J. Rowe (Treasurer), H. G. Rogers, Hon. Sec. Visitors: R. G. Verney, J. K. Bruce. Letters of inability to attend were received from Messrs. Withers and Edgar; also from Messrs. Roalfe Cox and P. Gregory tendering their resignation. The Chairman announced that it was proposed to elect Mr. Cox an honorary Fellow. Messrs. Hutchence, of London, and B. Freer, of Uppingham, were elected Fellows.

The annual report was read. The receipts during the year had been £47 6s., and the expenditure £75 19s. 10d.; while the funds in hand and on deposit were £160 5s. 10d. Eight new members joined and two resigned, the Society now numbering 111 Fellows.

Mr. Prudames was elected President for the ensuing year, and Professor Penberthy, Veterinary-Colonel Duck, Mr. Roots and Professor Pritchard, Vice-Presidents; Messrs. J. A. W. Dollar, Rogerson, Barrett, Wragg, Mahon, Villar, Macqueen, Veterinary-Captain Raymond, Gostling, Butters, Hunting, and Edgar being elected members of Council. Mr. Rowe was re-elected Honorary Treasurer, and Mr. Mahon Secretary. Messrs. Butters and Rogerson were appointed auditors, and Messrs. Barker, Worcester, and Bruce, London, were nominated for election as Fellows. Votes of thanks were awarded to the retiring President and Secretary.

MIDLAND COUNTIES VETERINARY MEDICAL ASSOCIATION.

(*Continued from page* 304).

Heart Sounds.

BY the simultaneous contraction of the ventricles, the closure of the mitral and tricuspid valves, and the impulse of the heart against the wall of the thorax, a single sound is produced, the first sound of the heart; this sound is closely followed by the second sound, which is more tapping in quality, and

corresponds with the closure of the aortic and pulmonary valves. Then comes the diastolic pause, which may be said to equal in duration that of the two sounds; the first sound is most loudly heard at the apex, the second at the base of the heart. The sounds of the heart are subject to considerable variations, which, like those of the pulmonary sounds, may be spoken of as *altered normal sounds* and *adventitious sounds*, or cardiac murmurs.

In addition to the above, I will mention the intermittent action of the heart; this may be merely functional, or due to some temporary disorders, such as indigestion. In many cases it is the result of organic or structural disease. Here comes in a very important factor in the examination of horses for soundness. Personally, I always make a point of listening to the heart sounds, and I maintain it is the duty of every practitioner to do so when called to examine a horse; as it frequently happens (so far as we are able to detect), the intermittent action of the heart is simply functional, and although we should, strictly speaking, be justified in rejecting such an animal, it may be only a temporary affair, and the heart resume its rhythmic beat in a few days' time. I have known horses work for years with intermittent heart action, apparently without the slightest inconvenience; in those cases, I should be inclined to look upon the cause as due to some defect in the intrinsic nerve ganglia of the heart.

The heart's action is sometimes irregular in the beats; it should be of uniform character, with an interval of uniform length between the successive beats; the irregularity may be of such a kind that no order can be observed at all, long and short intervals between the beats follow each other indiscriminately; it commonly occurs in mitral disease, and in dilation of the left ventricle.

Modifications of the normal sounds. The heart sounds may be accentuated, diminished, or reduplicated. They are *accentuated* from increased tension in the aortic or pulmonary arterial system, whereby the valves are caused to close with unusual force. This commonly occurs in fever, after exercise, and in hypertrophy of the left ventricle. In consolidation of lung, when the right one is affected, the heart may be easily heard on the right side, owing to the increased resonance imparted to the heart sounds by the lung consolidation.

Diminution of sound results from feeble action of the heart, or from its being surrounded by pericardial effusion.

Reduplication arises from want of synchronism in the action of the two sides of the heart, and may affect either the first or second sound.

Adventitious sounds, murmurs, or bruits accompany or replace the physiological sounds, and are due mainly to two causes: (1) obstruction or narrowing of a cardiac orifice, such as is produced by vegetations on the valves; (2) if the valves do not perfectly close the orifice some blood will flow back or regurgitate into a cavity whence it came, and this leaking will also give rise to abnormal vibrations.

Murmurs differ from one another, (1) in time; (2) in their relation to the orifices of the heart; (3) in the character of the sound.

In relation to time, murmurs which are heard with the first sound or between it and the second are termed *systolic*, others occurring during the dilation of the ventricle are termed *diastolic*.

In relation to the orifices of the heart, at each of the four orifices of the heart there may be an obstructive or regurgitant murmur, or both. Taking the least common first, obstruction at the pulmonary orifice is extremely rare and is always congenital. Pulmonary regurgitant murmurs are also very rare and also congenital; should they be acute they can only be due to malignant endocarditis. Tricuspid obstruction is exceedingly rare, and no special groups of symptoms can be referred to it. Endocarditis, which is the chief cause of valvular deformities, rarely attacks the right heart. Regurgita-

tion, however, may arise from a simple dilation of the orifice which the valve is unable to cover, although itself healthy, which frequently happens to the tricuspid orifice as a result of disease of the left side of the heart, producing tricuspid regurgitation, the only form of valve disease at all common on the right side.

Aortic obstruction and regurgitation usually occur together; pure aortic obstruction is very rare; obstruction and regurgitation are often the result of continued strain upon the circulation; obstructive and regurgitant murmurs would follow sudden rupture of the valves. In pure regurgitant cases the heart is greatly hypertrophied and the effect on the pulse is peculiar and characteristic; the hypertrophied ventricle drives the blood with great force into the arteries, and it is felt as a big thump against the finger, but the valves closing imperfectly, the column of blood is not sustained, and the pulse suddenly subsides; such a pulse is termed kicking, splashing, or collapsing. The termination by sudden syncope is more common in aortic regurgitation than in any other form of valvular disease.

Mitral obstruction at first affects the left auricle, which becomes hypertrophied in its endeavour to overcome the obstruction—usually due to vegetations on the valves, or the constriction that follows the healing of these vegetations; the murmur produced is rough, rumbling, churning in character, and generally loud. Mitral regurgitation and obstruction not uncommonly occur together; regurgitation alone is more frequent.

In character of sound all are soft, blowing, or bellows murmurs, except that of mitral obstruction, which is harsh, loud, and churning. We may take it that all murmurs in the heart indicate a serious lesion, and are most frequently met with on the left side of the heart; the commonest of these is *mitral regurgitation.* What valve is diseased may be determined by examining whether the murmur occurs during systole or diastole.

At the conclusion of his paper, which was very cordially received, Mr. Blakeway said the ordinary binaural stethoscope was practically useless for auscultating the horse's chest. It might be used for the dog, but not for the horse. It occurred to him, therefore, that by enlarging the receiver of the stethoscope, and thus entrapping a larger number of sound-waves, better results might possiblybe obtained. He had had one made (produced) with the chest piece 2½ inches in diameter, and with that he found he was able to detect the chest sounds considerably better than with the ordinary instrument, and quite as well as with the naked ear. He thought he could improve on this special stethoscope. He had had a second one (produced) made with the chest piece 3 inches in diameter, but it did not give such good results, as the friction sounds caused by its application were, he found, troublesome. The one 2½ inches in diameter he found an exceedingly useful instrument. Mr. Blakeway also showed a special balling iron he had had made to prevent the rocking in the mouth, and open at the end so as not to interfere with the free use of the tooth rasp. He also produced for the inspection of members a ball of hair found in the fourth stomach of a cow, and a specimen taken from a year-old ewe in which the vaginal and anal orifices were combined.

Discussion.

Mr. MALCOLM, after expressing his indebtedness to Mr. Blakeway for his very able paper, said it had often been urged as a matter of reproach against the Midland Association that they had not made such contributions from local men, and they had often had men from a distance, but very few of their own members had ventured to read papers at the meetings. He hoped the example Mr. Blakeway had now set would be followed up by other of their young members. He had been in hopes that Mr. Blakeway would refer more

to the conditions existing in special diseases than to the natural sounds of a horse's chest. In THE VETERINARY JOURNAL last week he noticed a professor in the Turin Veterinary School had sought to prove that the paces of a horse synchronised with its respiratory sounds. Could Mr. Blakeway give any opinion upon this assertion? He thought Mr. Blakeway was somewhat hard upon the average veterinary practitioner, for his opinion was that the average practitioner took considerably more care in the examination of the chest than Mr. Blakeway seemed to give him credit for. After testing the special stethoscope which Mr. Blakeway had shown them, he thought it was a better instrument than the usual binaural stethoscope; but whether one could hear the chest sounds better with this improved stethoscope than with the ear he was not in a position to say. Personally he had always used his ear without any intermediate body, but as he was not very quick in hearing he should be glad of any instrument that would assist him in taking the sounds of the horse's chest better than he could with his ear. But at the present time the little experience he had had of the binaural stethoscope had not allowed him to form a definite opinion. It required considerable experience, he believed, before one could determine the different chest sounds through the stethoscope. Mr. Blakeway had spoken of inspirations being wavy; what did he mean by that term? He had always looked upon the expiratory movement of broken wind as wavy, and he did not know any other condition of the horse in which they got such wavy action. In reference to the heart sounds, he had failed to find any reference to pericarditis, a condition more certainly often found in cows than in horses, in Mr. Blakeway's paper.

Mr. OLVER did not think Mr. Blakeway's paper was open to much discussion inasmuch as the greater part of it was facts that were not open to dispute. As to the stethoscope he had used both kinds constantly but without any satisfactory results, and he believed he could tell infinitely better the chest sounds by his ear than by any stethoscope that had come into his hands. The description Mr. Blakeway had given of the different chest sounds for different diseases all would agree to, but what was wanted was some means by which these sounds could be recognised in the early stages of the disease. One sound Mr. Blakeway had referred to as caused by cavity in the horse's lungs. He could not call to mind any one case of cavity in a horse's lungs, though cavities were frequently found in the lungs of cattle. He was afraid he did not always act up to Mr. Blakeway's injunction as to examining the heart action when certifying for soundness, but he saw no objection in doing it, though it was an open question whether a veterinary surgeon would be justified in rejecting a horse straight away whose heart action was not perfect; because it might be caused by mere temporary derangements. He had examined by auscultation now to a considerable extent, and found it a considerable aid in the examination of chest disorders. With reference to the abnormal condition in the specimen from a ewe which Mr. Blakeway had exhibited, he (Mr. Olver) had observed exactly similar conditions in a horse at Sutton Coldfield. He observed the horse for ten years working and it had a common orifice for the vagina and the anus. When the horse died he did not have the opportunity of making a *post-mortem*.

Mr. WARTNABY agreed with Mr. Blakeway as to the necessity of examining the heart sounds of a horse when certifying to soundness. It might not be right to reject a horse at first because of irregularity in the heart sounds, but he was afraid too many veterinary surgeons paid no attention to them at all. If they did so they would probably be much more severe in their examination.

Mr. CARLESS would have liked Mr. Blakeway to deal more with the abnormal sounds which were to be found in various diseased conditions of the horse's chest. He thought the stethoscope Mr. Blakeway had brought

forward would not become very popular; he had tried various instruments but had always gone back to the ear, as he found instruments were likely to be affected by external noises. With Mr. Blakeway he quite agreed that it would be better if veterinary surgeons generally gave more attention to the sounds of the chest. He thought more results could be obtained from auscultation and percussion than were got now.

Mr. HUBAND endorsed what Mr. Carless had said about the necessity of examining chest sounds. He had generally contented himself with taking the pulse and if he found that pretty right he did not generally go further.

Mr. TRIGGER, after hoping that the example Mr. Blakeway had set would encourage other members of the Association to contribute papers and so make them a self-reliant body, said there was no doubt that the importance of auscultation had advanced greatly these last few years, and there was no auscultation like that with the naked ear. Only a week ago he had a case in which it appeared that a mare was suffering from acute inflammation of the lungs, because she was blowing very heavily and he knew she was not broken winded. He diagnosed it as gastric pneumonia, the disordered breathing arising from the state of the stomach. He auscultated that animal and was perfectly astonished at the whistling sound in the lungs. He gave her six drams of aloes at once and ordered bran mash, and that of course would have been altogether wrong treatment in inflammation of the lungs. He however was convinced of the disorder, and kept the mare at active exercise, and in a day or two she was all right and the crepitous condition of the lungs had quite gone. There was no lung lesion here at all, only stomach disorder, and yet there was the extraordinary whistling sound in breathing.

Mr. DAWES mentioned another case of peculiar symptoms. A horse in harness which had bolted, was brought to him with a wound in its neck, it having ran into a wall. There was a large hole in the neck, but the trachea was not injured. He stitched the wound, and when it had healed advised the man to take the horse out for exercise. He went all right so long as he was driven in a straight line, but immediately he attempted to turn he commenced to fight and to make a most terrible noise in breathing, and he vomited about half a pint of blood which seemed to come from his mouth. He (Mr. Dawes) called in Mr. Malcolm, who suggested a long rest and quietness. This was done for two months and an improvement was noticeable, but still the horse was very bad when he was turned. A second period of rest of two months was given, and then he got all right. Still the question was, what was the matter with the horse when he showed such extraordinary symptoms in turning?

Mr. MALCOLM said the breathing of this animal, when he saw him, was highly spasmodic, and if he had been driven a few steps further in a circle he would inevitably have fallen. About ten minutes after being put back in the stable he appeared all right.

The PRESIDENT then summed up the discussion. He agreed with those speakers who had shown a preference for the ear over the stethoscope for auscultating. He thought there was something to be said for taking the pulse in examining a horse for soundness; he invariably did it now, but he thought there was more importance in taking the pulse than in listening to the heart sounds. Equine animals as a rule did not suffer much from heart diseases. He thought it might be well if copies of papers to be delivered were given to the members sometime before the meetings; it would facilitate discussion.

Mr. BLAKE in reply acknowledged, with appreciation, the kind way with which his paper had been received. One of his objects in bringing it forward was to induce members to try the stethoscope for auscultation. He was satisfied in his own mind that if they had something better than the ear they would make more advance in diagnosing chest complaints. The ordinary

medical binaural stethoscope he confessed was useless for veterinary work, hence the failures admitted by those relying upon it, but he was sure he could improve still further on the special one he had shown the meeting. In reply to Mr. Malcolm, the sounds from broken wind he should not describe as Mr. Malcolm had done by saying they were wavy, but rather that the expiration was double or dicotic. The indications of broken wind, as evidenced by auscultation, varied very much. By direct auscultation he had never been able to detect those wavy sounds. Mr. Olver found exception in his reference to cavities in the lungs, but he had satisfied himself by personal examination that cavities did exist in horses' lungs in cases of gangrene. Veterinary surgeons of course would be doing wrong in rejecting a horse on first examination for intermittent heart's action, but if he detected intermittent sounds he should advise his client to bring the horse back a day or two before passing it. It had been remarked that better results could be had from taking the pulse than from the heart; but it was not always possible to get the pulse distinctly. The pulse was not always sufficient indication in regurgitations. Some heart affections might not clearly appear in the pulse. Mr. Malcolm wished to know his authority for his statement in respect that murmurs due to stenosis of the pulmonary orifice were congenital, it was Dr. Frederick Thompson, M.D., London, F.R.C.P., etc. It was a fact that diseases did not exist to any extent on the right side of the heart, but almost invariably arose on the left, and the mischief on the right side was the sequel to it, Regurgitations on the right side were frequently due to dilation of the tricuspid orifice, the valves being insufficient to close it, and generally arose from mischief on the left side.

On the motion of Mr. TIPPER, seconded by the PRESIDENT, a vote of thanks was accorded Mr. Blakeway for his paper.

Next Meeting.

Mr. R. CARTWRIGHT moved and Mr. J. CARTWRIGHT seconded a resolution that Wolverhampton be chosen for the next meeting of the Association.

Mr. BURCHNALL proposed that Derby be selected, and this being seconded by Mr. WARTNABY, the vote was in favour of Derby.

After the meeting the members sat down to dinner, the President in the chair, and a very enjoyable evening was spent.

H. J. DAWES. *Hon. Sec.*

NORTH OF ENGLAND VETERINARY MEDICAL ASSOCIATION.

THE usual quarterly meeting of the members of the Society was held at the Hôtel Métropole, Newcastle-on-Tyne, on Thursday August 31st, the President W. Hunter Esq., in the chair. There were also present Messrs. H. Hunter, A. Chivas, C. Stephenson, G. R. Dudgeon, Major Durant, A. Hunter, W. Mitchell, J. B. Nisbet, W. Dotchin, F. Pickering, V. L. Fabritius, and the Hon. Sec.

Mr. CHIVAS, M.R.C.V.S., Corbridge read the following

NOTES ON CASES OF INFLUENZA OR "PINK-EYE" TRANSMITTED TO MARES FROM APPARENTLY HEALTHY STALLIONS.

This was an outbreak among mares this spring after being served by certain stallions, which I consider of very great importance, not only to us as veterinary surgeons, but to stallion owners and breeders, as the loss and inconvenience to them is very serious. I have not endeavoured to write a paper on the subject but will give you the history of the cases that came under my own especial notice.

The first cases I had were among the mares of a well-known breeder, who had four mares served about the same time by the same stallion; all of them

became very ill. I will now describe the general symptoms, although these varied a little according to the severity of the attack, and the severest cases I found most obstinate to treatment. The general symptoms were sudden and great prostration; loss of appetite; bowels constipated, frequently followed by purging; often attempting to urinate and passing a small quantity at the time; constant flow of water from the eyes, eyelids swollen, almost closing the eyes; lips and nose swollen; swelling of all four legs and along the abdomen; very stiff when attempting to move, especially the hind quarters, and in moving a constant dribbling of urine; conjunctiva yellow and injected; pulse from 70 to 100, temperature 104° to 107°; respiration up to 50. These are the symptoms of a number of cases, although many were much milder. The period of incubation seemed to be very short, as most cases made their appearance suddenly in about 7 to 8 days after service; and the worst cases ran their course in about 9 to 10 days. But it did not remain confined to the mares only; if they were not isolated from other horses they transmitted it to mares or geldings they came in contact with; whilst in the same stable it spreads from one animal to the other, with the same well-marked symptoms. A few only of these had lung complications, showing influenza or "pink-eye" in its best recognised form. In no instance had I an outbreak of this kind, but the first victim was a mare that had been served 7 or 8 days before she became ill. Every mare that had a foal suckling transmitted it to the foal, and it was very singular that the foals all showed symptoms in about 24 hours after the mother, and had all the well-marked symptoms the mother had—in many cases worse. I may state here that the only death I had was a foal, but I had the opportunity of making a *post-mortem* examination of a mare that was said to have suffered from this disease. The uterus seemed to have been very much diseased, as it was very much congested, with patches even becoming gangrenous.

The first stallion I have to mention (I will refrain from giving any names) served 36 mares early in the season; of these I could trace 25 he transmitted this disease to, and most of them came under my own notice and care. I have no hesitation in saying that I believe very few escaped, if any, although in some cases the attacks were so mild that little or no notice was taken of them. This horse was examined by several veterinary surgeons as well as myself, and three of us agreed that the stallion was apparently in perfect health. After the date of our examination, he served only a very limited number of fresh mares, but any he did serve seemed to show that the power of transmission was as strong up to the end of the season as at the beginning. Most of the mares that were ill did not prove in foal, but all came in season again, and were served again by the same stallion; in no instance did they show the disease a second time, and I understand that most of them are now in foal. That is the history of mares served by the first stallion. As I have already said, he was examined, and was to all appearance in perfect health and in the pink of condition; yet he was able to transmit this disease to the mares. The owner informs us that nothing had been the matter with the horse, to his knowledge, further than he had a bad cold in the end of the year 1891; that season he travelled the same district, nothing was wrong, and he left a large percentage of good foals.

I have two other stallions to mention that apparently transmitted the same disease to their mares. The period of incubation was the same, symptoms the same, power of infecting others, &c., in every respect the same as in the other mares, only of a very much milder form.

In the end of the summer of 1892, I had an outbreak among horses on several farms, but I am not prepared to say if it was the same disease. I gave it the name of influenza or "pink-eye," but what I had to deal with was what I considered a low form of a sluggish cold, with a very sluggish liver;

they all showed more or less filling in the legs and a watery discharge from the eyes; and increase of temperature and pulse. It was no doubt infectious, as it spread from one horse to another. These cases showed symptoms identically the same as the mild cases I have just described, and the two last-mentioned stallions were patients of mine suffering from the same disease at that time. These are a few notes I have taken from the outbreak. I will not endeavour to say anything upon the pathology of the disease, but I can only come to one conclusion—that these stallions transmitted germs of "pink-eye" which produced this disease in a certain form, although I think it is seen more in its true form where the mares infect others they come in contact with. The first-mentioned stallion I have no authority to say anything had ever been the matter with him beyond the cold the owners mentioned; but in the case of the two others, I think you will agree with me that I have a direct line between stallion and mare. Eight or nine months previous to serving mares this season, these two stallions suffered from a disease identical to that the mares suffered from after being served by them. I am aware even at the present time there are veterinary surgeons very sceptical about this transmission; they have asked me was there not influenza in the neighbourhood? I said No; but granted there had been, it was a very strange coincidence that a mare was more susceptible to become infected with this disease seven or eight days after being served than any other time. I have also talked the matter over with a member of the medical profession, who also looks upon it as doubtful; but when you get these practical and bare facts staring you in the face they are difficult to get over; and by what I have now seen and traced out, I have no hesitation in saying that a stallion is able to transmit a disease he has had himself to mares, even though he is apparently in good health.

This subject was first brought before the profession at the West of Scotland Veterinary Medical Association, by Mr. Pottie, of Paisley, about five years ago, but the notion received very little support from the members of that society. I believe it has been brought before the public by Professor M'Fadyean, also by Mr. Clark, of Coupar-Angus, who had an outbreak last year, and he supports Mr. Pottie's ideas in every particular.

I have not, nor can I enter into the true nature of the disease, but I have given you a few practical facts which I hope will lead the way for further information on the subject.

Discussion.

The PRESIDENT said he had listened to Mr. Chivas' remarks concerning this outbreak, and thought it had been of very practical interest to all of them. It was a very serious matter for owners of entire horses, as well as for those who possessed mares served by them. Eight or nine months appeared a very long time for these germs to exist in the system of the stallion, and to be as active as ever. He had been told that in some instances the stallions had been known to be quite healthy during the whole of a season—that is to say, none of the mares had any disease transmitted to them, and yet the next year, although they had not been the victims of the disease themselves, they had given the malady to nearly every mare they had served. He also agreed with Mr. Chivas that some cases were very slow in yielding to treatment, and mentioned a case he had at present which no drug apparently had any good effect on, for he had tried everything that he could think of.

Mr. C. STEPHENSON asked if the only cases of infection were after being served.

Mr. CHIVAS said it was through being served only; for he had found when mares had come into close contact with the stallion and had not actually been served by it, there was not any infection; but, at the same time, the mare

after being itself infected did have the power of spreading the disease to others by the ordinary means.

Mr. G. R. DUDGEON said he thought it quite possible for stallions to give the disease to mares by serving them, but did not think that one having the disease in 1891 could (unless re-infected more recently itself) transmit the malady to a mare two years afterwards. He had known cases of stallions suffering from the disease in the spring, and when they commenced travelling they gave it to those mares first visited; therefore the cases mentioned by Mr. Chivas were from some other cause. Was it not possible that a mare could have been affected first, and so have given it to the stallion, and then for him to spread it as described?

Mr. C. STEPHENSON thought they should all feel indebted to Mr. Chivas, not only for the trouble he had taken in collecting his facts, but also for the lucid and instructive manner in which he had brought them before the notice of the meeting. It was certainly an extraordinary thing that such a long time should elapse before the disease was conveyed to another animal, and then apparently only after service. In his opinion—and he had known several cases in which this disease was spread in a similar manner to that described by Mr. Chivas—in all cases where stallions are going on service, greater attention should be paid as regards the disinfection of the sheath, etc., so as to avoid its being thus conveyed. It was for this reason he asked Mr. Chivas the question whether it was conveyed to mares that had only possibly been touched or in other ways come into contact with the stallion other than by being served.

Other gentlemen having spoken on the excellence of the paper,

Mr. CHIVAS said: Gentlemen, I am disappointed we have had so little discussion, as I think this is a subject of very great importance; but I am not at all surprised, seeing that few of you have seen it. I am pleased to hear that Mr. Hunter agrees with me that apparently healthy stallions can transmit influenza to mares they serve; but he seems to disagree with me this far, that mares proved in foal after being ill. I am not speaking from theory, but from what I have seen; none of the mares that were very ill proved in foal until they were served again. Mr. Dudgeon does not agree with me in anything; he cannot think it is possible for a stallion to transmit pink-eye to mares nine months after being themselves ill, and for two years, that must be put aside altogether; but he must bear in mind that this is a disease well known in Scotland, and it has been known that stallions have transmitted this disease to their mares three years in succession. I quite agree with him that it is difficult to connect the link, but when you have got these facts that I have mentioned they are difficult to get over. Mr. Stephenson agrees with me so far, that apparently healthy stallions are able to transmit pink-eye to the mares; but he does not think it is from any germ of pink-eye in the stallion, but from some secretion about the penis, and if that organ were well washed and disinfected this trouble might easily be got over. I must tell Mr. Stephenson that all this has been done by Mr. Pottie, if not by others, but without any good results; therefore, I believe there is a germ of pink-eye left in the stallion, and which he can propagate to mares two or three years after.

A very cordial vote of thanks was accorded to Mr. Chivas for his paper, and the SECRETARY said he personally felt greatly indebted to him, for it was only after he had been disappointed in other quarters that he applied to Mr. Chivas a second time, and they had heard a very interesting paper brought forward at very short notice.

An interesting morbid specimen was shown by the Secretary. It was a portion of the trachea and œsophagus of a horse that had been killed a few days previously, forwarded by Mr. Hancock, of Uxbridge. The history of the case is as follows: Bay horse, seven years old, been used by a traveller

for the past year or more, and until a week or so ago gave every satisfaction, with the exception that although he had always had a fair appetite, he never appeared to get into really good condition. About three weeks ago, it was observed that the horse appeared to carry its head rather low down in a boring manner, leaning it forward. A few days later, August 10th, Mr. Hancock was called in, when it presented the following symptoms: Off its feed, head hanging down, staring coat, slight cough, very weak, bowels constipated, also a difficulty in swallowing anything. The temperature, pulse, and respiration were not increased, neither were the mucous membranes injected.

Two days later there commenced to appear in the front of the neck—about midway, and rather inclined to the left side—a swelling which rapidly increased in size, spreading down the course of the trachea. This, however, subsided considerabiy in a few days after setons had been put in the front of the chest; in a few days' time it was practically the same, only that on taking the least food a kind of vomiting ensued; the least pressure on the swelling produced a suppressed cough, and a quantity of mucus was ejected from the mouth. The horse remained in the same state until the 24th of August, when the appetite, which had practically been suspended for over a fortnight, and the other symptoms not showing the remotest signs of yielding to treatment, the owner consented to have it destroyed.

Unfortunately a *post-mortem* examination could not be made, but the man who slaughtered the horse cut out the portion of the œsophagus and trachea, as they presented an unusual appearance, and brought them to the surgery.

The SECRETARY informed the members that he had had an opportunity of seeing the horse while alive, and thought it would probably prove to be of a tuberculous nature, and the examination of the growth that appeared on the front of the trachea certainly conveyed that impression when seen after slaughter. There was also a great thickening of the muscular portion of the œsophagus, as it passed through the chest, and only a very small opening existed for any food to pass; on this were found, *post-mortem*, several little growths which presented the characteristics of tubercular nodules.

An interesting discussion took place, and the members appeared to consider it a case of tuberculosis, but felt that it was unfortunate a *post-mortem* inspection could not be made.

Major DURANT said he had a horse at present showing similar symptoms of a milder type, and he should watch its progress with interest.

The PRESIDENT proposed a cordial vote of thanks to Mr. Hancock, Sen., for his trouble in forwarding the specimen.

A vote of thanks to the President for his presiding brought the meeting to a close.

W. ASHTON HANCOCK, *Hon. Sec.*

SOUTH DURHAM AND NORTH YORKSHIRE VETERINARY MEDICAL ASSOCIATION.

THE fifth annual meeting of the South Durham and North Yorkshire Veterinary Medical Association was held in the North Eastern Hotel, Darlington, on September 8th. Mr. F. R. Stevens presided. There were also present Messrs. J. G. Deans, P. Snaith, H. H. Roberts and J. R. Crone, Bishop Auckland; Messrs. W. T. Briggs, G. J. Harvey, W. N. Dobbing, C. G. Hill and C. T. Holmes, Darlington; Jno. Nettleton, Northallerton; W. A. Hancock, Newcastle-on-Tyne; G. E. Gibson, Ferryhill; W. Awde, Stockton-on-Tees. Mr. E. R. Gibson, Coxhoe, was present as a visitor.

Mr. HARVEY reported a case of endo-metritis which had occurred in a white heifer.

Mr. NETTLETON also brought to the notice of the members a successful operationhe had performed on a mare under chloroform, for ruptured perineum. The passage had been ruptured in the act of parturition, and the fæces were voided from the vagina. Three sets of sutures were used, one to each mucous membrane, vaginal and rectal, and a deep set through the muscular structure. It had been necessary to operate twice, the first being only partially successful, but the second operation was a complete success.

Mr. C. G. HILL, M.R.C.V.S., Darlington, and Mr. G. E. Gibson, M.R.C.V.S., Ferryhill, were admitted members of the Association.

Mr. C. T. HOLMES, M.R.C.V.S., of Darlington, was nominated for membership.

Mr. F. R. STEVENS proposed "That it is desirable that some tooth instruments be purchased for the use of members of the Association, and that Messrs. Arnold and Huish be asked to forward instruments for extracting molars, and tooth shears for cutting same, for their approval at the next meeting;" seconded by Mr. Roberts and carried.

Mr. DOBBING then moved a resolution that in future members of the Association should give no particulars when sending out their accounts, but might give details if requested to do so.

Mr. AWDE seconded the proposition. In the discussion which followed, some members stated that they already followed this rule, but the majority present seemed to think that it would not be generally acceptable to their clients. As the feeling was against the resolution it was decided to withdraw it.

Mr. STEVENS then vacated the chair in favour of Mr. J. G. Deans, the president-elect, and was accorded a hearty vote of thanks.

Mr. DEANS then delivered an address.

"ANTHRAX: CHLOROFORM."

Gentlemen,—In the first place, I take the liberty or rather opportunity of thanking you for the honour conferred in electing me as your president for the coming year. As is customary, I say I am sure there are many of your members whom I consider would far more fittingly grace the position than I can, but I suppose I must just do my best, and trust to the co-operation of all the members to try and make the year a successful one.

We are adding to our members every year, I may say every meeting, and we ought all to be very pleased to see so many visitors here to-day; it shows a unity in our profession worthy of our motto, *vis unita fortior*.

I must apologise to those who have come from a distance expecting to hear some interesting and instructive paper from one of the shining lights of our profession, but we have been disappointed in not being able to have Professor Macqueen. Owing to the retiring of Professor Axe, Professor Macqueen has had to take up some new subjects, and cannot spare the time now to honour us by reading a paper, but has promised to do so at no distant date. With your kind forbearance I will endeavour to make a few remarks on Anthrax, and then on the administration of chloroform in all operations of a serious character.

Anthrax.

Its history seems to have been traced back to the time of the plagues, and some authorities state that this was the ailment which caused the death of the cattle of the Egyptians, whilst others assert it was foot-and-mouth disease; but this is of no importance to us, as the profession must have been very much in its infancy then, and I don't think anything would have been known about the germ theory of disease. I intend to-day only to call your attention, practically, to the various points of interest to us as veterinary surgeons.

Etiology. Animals that have been drinking stagnant water, or water coming from or containing sewage, have often been found to suffer from anthrax, more so than those that have been accustomed to good, clear and pure water. For instance, there was an outbreak of anthrax at a farm through which flowed a stream that supplied all the farms where there had been an outbreak of anthrax in the same district for the last seven years. This raises the questions: can the bacillus anthracis remain latent in the water, or is there a spontaneity of origin, or does some simple, benign organism under certain influences become transformed into the bacillus anthracis.

In my opinion the bacillus can remain latent, and as proof of that theory I will quote some cases which came under my notice on one farm in our neighbourhood. A certain farmer bought some sheep twenty-eight years ago at Stockton and put them into a certain field on his farm, this farm I may state had never before this time been known to harbour anthrax, and in about two weeks afterwards he lost nearly all the sheep together with a horse and some other animals that were grazing in the same field. He forgot all about this until, seven years ago, he had a cow die suddenly and others unwell, and his veterinary surgeon certified the cause of death to be anthrax, and that the other animals were suffering from the same complaint. I do not remember how many died, but I think about three or four. Again two years ago, when the cows were grazing in the same field, there was another outbreak of anthrax. Now it could not very well happen that this person had anthrax imported on to his farm at three different times, and none of his neighbours have any of their stock affected. I think that the germs of the disease must have been in the soil after the first outbreak, as the sheep that died first were buried in the same field, and that owing to drainage or some climatic influence the bacillus was brought up to the surface, and the animals feeding on the field got contaminated.

I do not credit spontaneity of origin, but it has been proved that you can attenuate or lessen the virulence of a disease by continual cultivation of the virus downwards; and if that is so, some people hold that influences may be brought to bear on benign organisms, so that they may attain to the most virulent character. The bacillus subtilis found in impaired cotton cake can be cultivated until, when inoculated into an animal, it will produce a disease resembling, or in fact analogous to, anthrax; and the bacillus anthracis can be found and cultivated from the blood of the animal so inoculated. As a proof of the appearance of this disease on a farm where such a thing had never been heard of before, and where there had been no importation of cattle for a considerable time, I may state that I was called to go to a case near Frosterley, where the farmer said he had lost a cow the day previous and had another one unwell; from the description given me of the cases I supposed it was a case of anthrax, and took drinks to the number of cattle on the place, together with some Jeyes' fluid. When we got there the other animal had died, so with Mr. Gibson, who was then assisting me, I commenced to make a *post mortem* examination of the last animal that had died, and found our worst fears to be confirmed. During the examination Mr. Gibson accidentally scratched his hand, and I advised him to suck the wound, but he did not seem to care to, so I did it for him. A butcher, who was looking on, merely held up the legs while we were dissecting; I never thought for a moment there was any danger or likelihood of his being inoculated; but to my surprise, about a week afterwards, I heard that he was suffering from malignant carbuncle, and had to have part of his arm taken off. The piece amputated was sent to London, and examined microscopically, and found to be teeming with bacilli anthracis; thus proving that the animal must have died from anthrax. Now here comes the strange part of the business. We gave all the cattle on the farm—and some were standing in the same byre as the two that had died—a cow-drink

composed of Epsom salts 1lb., together with tonics, adding half-an-ounce of Jeyes' fluid to each drink, and there was not another animal took the disease, and never has since; and there could be no mistake that the butcher's case was absolute proof of the nature of the disease. I could not in any way account for this isolated outbreak, except that the farmer was feeding the cattle on foreign cotton cake; but perhaps some member present will be able to suggest a solution to this difficulty.

Some of the experiments which have been carried on by specialists in this branch might be interesting, although personally I cannot see what use they can be to us with the present anthrax order in force. Pasteur had ten cows and fifty sheep given him to experiment on. Six cows were to be inoculated, four not; twenty-five sheep to be inoculated, and twenty-five not; the whole to be afterwards inoculated with the uncultivated virus. The twenty-five sheep and six cows were inoculated with five drops of vaccine, and after twelve days were inoculated with a stronger cultivated virus. Two days after the whole of the animals—those that had been inoculated and those that had not—were inoculated with the uncultivated virus. Two days after this, of the twenty-five sheep not protected with the cultivated virus twenty-one were dead and others dying; the non-protected cows were suffering from intense fever and had great swellings on the seat of inoculation. The protected sheep were all well, and likewise the protected cows. I think the above experiments prove that the treatment and prevention of disease by inoculation is just in its infancy, although it can't be expected that we hard-working, everyday kind of veterinary surgeons can have the time or inclination to carry out these experiments to a definite end.

What I should suggest is that so much money should be allowed annually by the Board of Agriculture to some energetic and scientific veterinary surgeons to carry out such experiments; and when they have the matter simplified and made feasible for us to take up, then we may do so without running the risk of our operations being failures, or perhaps causing the death of our clients' stock.

For instance, I bought, from a well-known firm of veterinary chemists 50 tubes of vaccine to vaccinate dogs to prevent distemper. I went to one of the largest breeders of collies in England, and inoculated several puppies on the inside of the ear and found no result whatever; I continued the operation for several days, and had to give up in disgust, after my client, who was deeply interested in the matter, had a good laugh at my expense. What was the cause of failure I cannot say, but if anyone would care to try the operation I will gladly give him some tubes, as the fault may have been mine.

In concluding this subject, I may say that with the great risk to human life attending post-mortem examinations of anthrax, it becomes us as veterinary surgeons to exercise all our ingenuity and professional ability to try and prevent the spread of so virulent a disease. This can only be done by careful and practical study of the nature, history, and propagation of an outbreak when we have one in our district, and then coming to such meetings as this and in all fairness admitting where we are at a loss to understand anything, and thereby obtain from our brother professionals that information which we may lack, whilst we may be able to impart some similarly valuable information on other subjects.

Chloroform.

The next subject I intend to make a few remarks on, is as to whether it is desirable or necessary to administer chloroform when operating on the lower animals, unless in very exceptional cases. I see in *The Record* for August 26th an editorial that pretty well expresses my sentiments on the matter. In it Mr. Hunting states pretty clearly the cases where it is necessary, and

where it is merely a waste of time and money. I consider that half the pain of an operation in the human subject is in the anticipation thereof, and in our operations we have not that difficulty to contend with. In the dog, for instance, the majority of operations can be done before you would have time to give chloroform, and if howling be an indication of pain you have most of that during the administration of the anæsthetic. Again, the question of time comes up; it takes more time to give the chloroform and await the recovery of consciousness after the operation, than the whole operation takes to complete. You cannot always have someone with you competent to give chloroform, and should your patient die, then if your assistant was not a qualified veterinary surgeon, although you have not a coroner's inquest to attend, it is sometimes rather unpleasant.

I contend that until our clients can pay us better we need not bother to try and be too humane at the expense of our professional reputation, and the risk of being considered exorbitant in our charge. I consider that if a good tourniquet be placed above the seat of operation, if on the limbs, or some local anæsthetic used if not suitable for the application of a tourniquet, and the operation performed in an expeditious manner, then we have done quite sufficient in the majority of cases. But if you commence with an operation of the nature of which you know nothing until you have cut down on—say, for instance, a tumour, and find that you have not all the instruments you require with you, and have to manufacture them out of anything you can lay hand on—knitting needles, kettle spouts, etc., in that case it would be better if your animal were under chloroform.

A correspondent in last week's *Record* takes up the cudgels on behalf of humanity, and says, surely it is not elevating the standard of veterinary surgery to entertain the question of time and expense. Well, I don't see why we are to sacrifice or devote our time and money for the benefit of the owners of stock, if they don't care to pay for the same. Mr. Dobbin has just suggested that we send in our accounts without stating items, etc.; if we did that and operated under chloroform, in the majority of cases we would have our bills sent back, whereas if we write an elaborate bill out to this effect: Casting and operating under chloroform on horse's teeth, so much—even if only removing a wolf tooth, we might have some chance of getting paid—the mysterious always acts on the British public. This correspondent goes on further to say "there are men who would not hesitate to spend a long time exposing the metacarpal nerve, or who would slowly cut away the most sensitive structures in the foot in quittor, quite unmindful of the mute appeals of the poor unfortunate bound down in a helpless condition." This I do not believe. I consider his remarks a great reflection on the profession. But this I do know, that when you have given you a pet dog to do some trifling operation upon, and it dies from chloroform before you have commenced to operate, there is some agony next morning when the old lady calls at your surgery. In concluding this rambling paper, I may say that if one animal out of 50 were to die under your charge, you had far better, from a financial point of view, have lost the price of the horse.

Discussion.

Mr. ROBERTS referred to the painful nature of the disease anthrax in horses, and also to the slaughter of animals which had been in contact with those diseased, and thought it was quite time that something was done to prevent such waste of public money.

Mr. STEVENS corroborated Mr. Roberts' statement as to the painful symptoms present in horses suffering from anthrax, and said that in the cases he had seen they seemed to have colicky pains, and in one case the loose box was covered with foam.

Mr. HANCOCK thought that the action of the Local Authorities in Yorkshire, in regard to a recent outbreak of the disease, was altogether wrong.

Mr. AWDE believed that there was great danger of the bacillus of anthrax being brought to the surface of the ground by earth worms.

Mr. ROBERTS proposed and Mr. STEVENS seconded the following resolution, which was carried unanimously:—"That in the opinion of the members of this Association, there is no necessity for the wholesale slaughter of cattle on account of outbreaks of anthrax, which disease is usually propagated by means of food and water, and is not directly communicable from animal to animal as infectious diseases generally; and they consider that Local Authorities should not have the power to slaughter animals which have been in contact with those suffering from the disease, as recorded in several recent outbreaks."

Mr. STEVENS proposed and Mr. AWDE seconded the vote of thanks to the President for his address.

The SECRETARY read a letter from Mr. Nash, of Richmond, tendering his resignation as a member of the Association, owing to his indifferent attendance at meetings, but it was unanimously decided to ask him to reconsider the matter.

Mr. HARVEY proposed, and Mr. HILL seconded, that discussion on "Professional Charges" be adjourned—Carried.

The Annual Dinner.

Subsequently the members dined together at the North Eastern Hotel. Mr. Deans presided, Mr. Stevens occupying the vice-chair. An excellent dinner was provided by the Misses Parsons. After the loyal toasts had been heartily honoured, Mr. W. A. HANCOCK proposed the toast of "Success to the South Durham and North Yorkshire Veterinary Medical Association." He congratulated them upon the rapid strides they had made during the time their Association had been in existence. It was five years since they started, and he was rather sorry at the time that they did start, because he thought they would have rather an up-hill struggle. However, any forebodings he might have entertained then had been driven to the winds, because their meeting that day had been quite as successful as any meeting he had ever attended since he had been connected with what he might describe as the parent Association in Newcastle.

The HON. SECRETARY (Mr. Awde), in responding, said he believed that at the time when the Association was formed there was considerable apprehension in the minds of many that it would not succeed, but since the Association was launched it had done quite as well as they ever expected it would. That success had been contributed to by the way in which members had supported the Association by attending the meetings and reading papers. If the members would only stick to the Association in the future as they had done in the past he did not think there was any reason to fear the Association would not go on and prosper.

Other toasts were "The Visitors," proposed by Mr. G. J. HARVEY, and responded to by Mr. GIBSON, and "The Press," proposed by Mr. ROBERTS, and responded to by Mr. J. H. WILLIAMS, of *The North Star*.

LANCASHIRE VETERINARY MEDICAL ASSOCIATION.

THE quarterly meeting of the Association was held at the Blackfriars Hotel, Manchester, September 7th. The President, W. A. Taylor, Esq., occupied the chair. There were also present Messrs. Jas. Laithwood, T. Hopkin, J. H. Carter, J. L. C. Jones, E. Faulkner, H. Hall, J. McKinna, W. Dacre, A. Lawson, W. F. Shore and J. B. Wolstenholme.

Mr. Henry C. Harrison. M.R.C.V.S., of Bowden, was elected a member of the Association.

Mr. Walter Ackroyd, M.R.C.V.S., of Hebden Bridge, was nominated for membership.

The PRESIDENT explained how an expected paper for this meeting had been unavoidably postponed, and that an open meeting had been rendered necessary.

Mr. A. LAWSON gave notice that at the next meeting he would move that an alteration be made in the day and hour of meeting.

Mr. J. H. CARTER, of Burnley, gave particulars and exhibited the humerus of a cart mare, attached to which was a large osteoma, probably developed in the flexor brachii, the measurements of which were:—length of new growth, 11 inches; diameter, 4½ inches; the greatest girth, including the humerus, 23 inches.

Comminuted Fracture of Os Suffraginis in a Mare—Partial Union.

Mr. CARTER also exhibited the os suffraginis of a foreleg from a nag mare, showing more or less union after a comminuted fracture. He said:—

On the 12th of June of the present year, I was requested to visit a well-bred chestnut mare, the property of one of our local butchers, which was running out at grass, with foal at foot, at Entwistle, some four or five miles from Burnley. Upon my arrival at the farm and from information gathered on my way to the field to view my patient, I learned that this injury had occurred some ten days previously, but not until now did they think it of a serious nature; and we were not long in arriving at the spot where she was grazing peacefully, with foal by her side. It was easy at the first glance to see that the mare was suffering from fracture of the pastern joint, and upon manipulation my opinion was confirmed—there was undoubte ly comminuted fracture of the os suffraginis. I informed my client of the gravity of the case, and in answer to his question, "Well, what's to be done?" I immediately replied "Slaughter," but this mare being a great favourite, he was naturally very much upset, and commenced relating her past history; the journeys he had time and time made with her in the day, as much as 60 and 70 miles, and about her returning home as cheerful and as fresh as when she started. He would not hear of her being destroyed without first giving her a chance of recovery, and I was to do what I could. I urged him to take my advice and spare expense, time, and trouble, never to name the suffering of the poor animal.

My entreaties, however, were of no avail. So I had her brought slowly out of the field and put into a comfortable loose box. Having some of Burgess's plaster bandages with me, I managed to make some splints, wrapped them with plenty of tow, and commenced my hopeless task, at the conclusion of which I had the mare's head tied up short, and all her surroundings made as comfortable as possible. I now left her, promising to bring the slings and what other paraphernalia I might require. Upon my arrival the following day, June 13th, I found the plaster bandages and splints applied the day previous intact, so did not disturb them, but simply applied plenty of plaster of Paris around the parts, wrapped over this a strong calico bandage and again smeared over this a fresh supply. I then placed the mare comfortably in the slings, for which support she seemed very grateful.

June 17th. Upon my arrival this day I found all to be going on well; the plaster casing had cracked in several places, this, however, was soon remedied by smearing over the weakened parts a fresh supply of plaster of Paris; also administered a tonic ball.

I called again on June 23rd, a week's time, and on examining the limb I found that the upper portion of the bandage was pressing rather tightly, in

fact there was quite a sore around the top edge of the bandage; this I cut and removed which gave vent to a little pus, I cleansed the part antiseptically, and applied an antiseptic gauze bandage, and left a little wound lotion to be applied daily until my next visit.

July 12th. Nothing fresh to report.

July 24th. Exactly six weeks from my first visit, I found my patient could place her foot firmly upon the ground and allow me to lift the opposite foot, thus throwing the whole weight on the affected limb. But when pulling her forward or backing she put more weight upon the heel with a tilting up of the toe. I now removed all the wrappings, and all seemed to be progressing as well as could be expected from a case of this sort. There were a few raw places where the bandages or splints had borne with undue pressure, but they were of no consequence. Instructed the man to apply a little lotion to the wounds. I may say during the whole of this period we were giving tonics, and supporting the system as well as we knew how by good nourishing food, as she had the foal to suckle.

My next visit was on August 1. The wounds were all healed around the parts where the bandage had been. I applied a severe fly blister around the fetlock joint down to the coronet, and left her.

August 6th. I was pleasantly surprised to see how she could move about, and lift one fore foot from the ground and then the other without much inconvenience. I now removed the slings, and to my joy she walked round the box quite easily, but there was yet a tilting up of the toe and too much pressure on the heel to be elegant in gait.

I need hardly tell you that the mare had lost condition during this long confinement, which could only be expected under the very trying circumstances. She was, however, cheerful and eating very well and had a plentiful milk supply; the foal on the other hand had grown wonderfully and was in excellent condition. Informed the man in attendance he could turn them out for a few hours each day if fine. Well, gentlemen, up to now all had gone on serenely, and all was sunshine, but unfortunately a cloud came over the scene. On August 9th, only three days later, I was hastily summoned to visit my patient when my client informed me that she was "putting down her foal bed" as he euphoniously termed it. I at once started off to see what could be done, and as the saying goes "forewarned is forearmed," I put into my pocket some carbolised oil, and West's uterine clamp.

I found the mare continuously stretching and straining as if to micturate. I raised the tail and found a large protruding mass of a black and red colour, larger than a cricket ball. The tail whisking to and fro was a source of irritation to the parts, so at once wrapped this appendage in a bandage, and upon closely examining the mass I found it not to be the uterus, but everted bladder. After cleansing the parts with lukewarm water the opening of the ureters were visible, and at each strain kept ejecting drops of urine. I now smeared the parts over with some carbolised oil and endeavoured to return the viscus by gentle pressure; this I found impossible; first from the great amount of congestion and from the excessive thickness of its walls, and secondly from the continuous straining the whole time.

I now administered a dose of chloral-hydrate, and put on the twitch; this certainly had the desired effect of reducing the straining, but after many vain attempts I found it impossible to get it home. After some little consideration I returned it as far as possible into the vagina beyond the labiæ, which I brought together over the imprisoned mass, and placed on my clamp. I now left her, quite easy and comfortable, for the space of forty-eight hours; thinking that leaving the mass so confined the congestion and thickening might subside and that I should have a much better chance of returning it to its proper home.

August 11th. Forty-eight hours later I once more, and for the last time, saw my long-suffering patient, and under most painful circumstances; for I found her lying out in the middle of the field adjoining the building where she had so long been confined, and I grieve to say, upon enquiry she had lain here on her broadside for twenty-four hours, and was so exhausted as to be unable to raise herself, and during this exposure had experienced one of those terrible storms that few of us will ever erase from our memory. She was starved, and shivering from head to foot.

I administered some stimulant medicine, after which I had her put on a float and dragged back again to her box, comfortably bedded down, plenty of rugs, &c., thrown over her, and all her surroundings made as comfortable as possible. I now removed the clamp and felt for the everted bladder, and to my great surprise returned it quite easily into its natural position; but it was too late to be of any avail, my poor patient died on the following day.

I now ask you, gentlemen, particularly to notice the great amount of provisional callus thrown out by way of nature's efforts to repair; and on the posterior lower third of the os suffraginis you will perceive a good portion of the bone is wanting. This to my mind had been simply pulverised, and absorbed by the blood-vessels, for I was particularly careful in the preparation of this specimen to lose no small portion whatever.

What is most remarkable to my mind is how this poor brute managed to put her foot to the ground and support the proportionate weight of her body on such a diseased and mutilated column.

A hearty vote of thanks was tendered to Mr. Carter for his communications, and a short discussion on fractures in general followed.

It was resolved that a letter of thanks be sent to the Eastern Counties Veterinary Medical Association for their kindness in requesting their members to record their votes in favour of the nominees of this Association in addition to others of their choice.

Mr. E. FAULKNER thanked the members of the Association for their assistance given him at the recent election of members of Council.

J. B. WOLSTENHOLME, *Hon. Sec.*

GLASGOW VETERINARY COLLEGE.

THE winter session of the Glasgow Veterinary College was commenced on September 6th, when the introductory lecture was delivered by Professor James M'I. McCall, M.B., C.M., M.R.C.V.S. There was a large attendance of students, who occupied the greater part of the space in the lecture hall. Professor Cleland, Glasgow University, presided, and among the others present were :—The Rev. Mr. Watson, Woodside Church, Glasgow; the Rev. Mr. Grant, Assistant, Gartsherrie Church; Professor William Limont, Professor Aikman, Professor Thomas King, Professor James Murphy, Mr. Thomas A. Trotter, M.R.C.V.S., and a great many veterinary surgeons from various parts of the country.

The CHAIRMAN, who was received with applause, then proceeded to introduce to the meeting Professor James M'Call, who, he said, was his former student and excellent friend. This he considered a very pleasant duty, because he was always pleased to come to that college. The college had been known to him for a much longer time than it was known to most of them present. He first met their learned principal in 1862, but he was aware that the college began its existence in 1861. Their mutual friend, the late Dr. Forbes, introduced him to Principal M'Call, who led him to undertake, at the age of thirty, to deliver some lectures on the anatomy of the horse, so that he might now call himself one of the old professors of that institution. They might allow him to say that the Glasgow people did not so fully value the

results accruing from the college as they ought, or the excellent work that was done by Principal M'Call, for it was to his enthusiasm, his courage, and, would they allow him to use the old Scotch expression, his "go through," that the college occupied such a high position. When the charter for the college was obtained, there were only ten students attending it, but he rejoiced to know that last year the number was 137. It was an immense undertaking to inaugurate a college of this kind, but Principal M'Call had overcome all difficulties, and now their institution was second to none in the whole country.

Professor JAMES M'I. M'CALL, on rising to speak, met with a most enthusiastic reception. He said:—Mr. Chairman, ladies, and gentlemen—At this time, when veterinary medicine has attained to such a pitch of perfection as to necessitate the undivided study of the student for four consecutive years in order to graduate, I think it will not be inopportune of me to give a rough sketch of its progress from the earliest times. In order to do so you must accompany me back in your mind's eye to some 1000 years B.C., at which time a man named Erictheusa was employed in breaking in young horses, and as at that period the riches of countries and individuals was reckoned in proportion to the live stock they owned, it necessarily follows that the ailments which flesh is heir to, and more especially horseflesh, must have had a considerable amount of attention devoted to them. Among the early Egyptians horses were employed for the purposes of war, and such being the case, who can doubt that their ailments were attended to according to the amount of knowledge then existing? The Egyptians in their turn did what they could to initiate the Grecians into the mysteries of equine medicine; and not without success, because from history we learn that this branch of medicine flourished in Greece, and one of its most able exponents was "Chiron' the "Thessalian," otherwise known as the wise Centaur, who, in addition to treating animals, also practised upon the human subject, and it may be interesting here to note that a representation of him in his original character of the Centaur occupies a prominent position on the counter seal of the crest of the Royal College of Veterinary Surgeons. We have only to read some of the works of Homer, who lived some 900 years B.C., in order to learn that he also was an admirer of the noble animal, for has he not transmitted to us in song and story the deeds of prowess of the horse over the Grecian courses? Xenophon, the renowned poet, warrior, and philosopher, did not disdain to devote some of his literary talents to the subject of the horse, as exemplified in his treatise on equitation, which shows us undoubtedly that a widespread interest was taken in that animal by the most eminent and distinguished men of his day. Hippocrates, whose name must touch a responsive chord in the heart of all lovers of medicine, treated the horse as well as his master, and this pioneer of human medicine in early times wrote a very interesting book on the curative treatment of horses. When Rome, with her all-conquering armies, had attacked and subdued Greece, the horse also fell into her clutches, and his study was taken up with increased vigour by numerous Roman writers, of whom, for a time, Columella held the palm. Subsequent to him one Vegetius appeared, who seems to have eclipsed all his predecessors, and about the year 300 after the birth of Christ, he wrote a book condensing and concentrating all that had already been written by the most enlightened authors of the Roman Empire. But, alas, his was the last dying spark which illumined the veterinary origin, and was followed by a profound darkness, which continued for many centuries. This was probably due to the decline and fall of the Roman Empire, as in its fall not only veterinary medicine, but also human medicine, and almost all other branches of science, were for the time being buried. During this period, which we might call the dark age of veterinary medicine, the treatment of the horse fell from its high position among the learned classes to the level of the shoeing-smith, while other

animals were treated by the men who fed and tended them. The ancient and honourable name of Veterinarians sanctioned by the classics of the Augustan age, became lost in the humble denomination of Farrier, a name derived solely from the metal on which he worked, and for a long period the ignorance of the shoer and the humbleness of his title remained indissoluble. Things continued much in this state for the next 900 years, and it is not until the end of the twelfth century that there were any visible signs of improvement. At that time we learn that the Moors had among them a man called "El Baitar," or "the veterinarian," a native of Malaga, who was skilled in the treatment of the lower animals; and upon his death, in the year 1216, he left behind him a treatise on the virtue of herbs, on poisons, on metals, and on animals, the whole reduced into alphabetical order in three volumes. After him followed many Spanish writers upon the subject of veterinary medicine, and we can with truth say of these, that if they did not enlarge the boundaries of veterinary science, they at least made it keep pace with the condition of human medicine amongst them, which at that time was rather backward.

(To be continued.)

Notes and News.

TUBERCULOSIS IN SCOTLAND.—At a recent conference of the Sanitary Association of Scotland, Professor Wright estimated that tuberculosis in cows caused an annual loss to the owners of dairy stock in that country, of nearly £440,000.

A GIGANTIC PIG.—An immense hog, standing 5 feet high, measuring 3 feet across the shoulders, and 8 feet from the tip of his snout to his tail (says the *Breeders' Gazette*), has just arrived, and is to be exhibited at the World's Fair, Chicago.

TUBERCULOSIS IN CANADA.—A telegram from Ottawa states that Professor Saunders declares that tuberculosis is entirely stamped out among the cattle on the farm chosen for the carrying out of experiments. The animals were treated with Dr. Koch's lymph, which proved highly successful in detecting the presence of the disease in 21 animals, which were immediately destroyed.

AMERICAN TROTTING HORSES.—The fastest mile trotted this season in the United States by a yearling in a race against other horses is the 2·37½ of Judge Hurst. Ths fastest mile by a pacer under similar conditions this year is the 2·17¼ of Lena Hill in a second heat. These phenomenal youngsters are by the trotter William M. Hill, 2·20, and he is by Sir Walter, 2·24½, a son of Aberdeen, 2·46.

BACTERIAL DISEASES OF ANIMALS IN INDIA.—The Imperial Bacteriological Laboratory for the Investigation of Animal Diseases in India, is, according to the *Indian Medical Record*, to be situated in Mukhteshur, a hill some 7,000 feet high, between Naini Tai and Almora. The Indian Government has decided that the new Pasteur Institute cannot be amalgamated with the Imperial Bacteriological Laboratory.

GLANDERS IN CUBA.—Glanders is becoming so prevalent among the human population of Cuba that a commission has been appointed to devise measures for the repression of the disease. According to the *Cronica Medico-Quirurgica de la Habana*, glanders was imported into Cuba from the United States during the insurrection of 1868, and ever since it has been largely prevalent among horses throughout the island. The first case in the human subject occurred in 1870, and since then from twenty to forty persons have died of the disease every year. One of the most recent victims was Dr. José Francisco Arango, a brilliant physician and teacher, distinguished for his

literary not less than his scientific attainments. By a melancholy coincidence, the first case of glanders in the human subject which occurred in Cuba was reported by him.

SLAUGHTER OF ANIMALS IN GERMANY.—The curators of the town central cattle market in Berlin have reported the following to the magistrate:—During the month of August there were slaughtered 10,940 head of horned cattle, against 10,736 in August, 1892; 10,183 calves, against 8,359; 43,876 sheep, against 37,708; 43,755 pigs, against 38,720; or a total of 108,754 animals, against 95,523 in August, 1892, being 13,231 more than last year. Of these, 107 head of cattle were unfit for food, 84 on account of tuberculosis; 19 calves, 7 sheep, and 313 pigs; 19 of these were tuberculose, and 9 trichinose. Foot-root was found in pigs, but the animals were passed after removing the parts affected. Of organs and parts of animals there were 2,260 amongst cattle, calves 30, sheep 2,815, pigs 2,934, or 8,039 parts of animals. The number of animals brought to the slaughter-house in Hamburg has considerably increased since it was opened in October, 1892. During that month the weekly slaughterings amounted to 432 head of horned cattle, 381 calves, 1,759 pigs, and 462 sheep. The highest number was attained in one week of March, 1893, with 1,415 head of cattle, 521 calves, 3,406 pigs, 3,574 sheep. From October 10th to the end of 1892 there were slaughtered 5,188 head of cattle, 4,514 calves, 20,412 pigs (8,641 head of which were examined for trichinosis), and 7,926 sheep. From January 1st to June 30th of this year, the number slaughtered was 24,894 head of cattle, 14,225 calves, 48,676 pigs, and 41,350 sheep. The number condemned by veterinary authority, as unfit for food, was 58 cattle, 2 calves, 4 pigs, and 38 sheep.

In reply to an inquiry in last month's JOURNAL, as to German works on diseases of the dog, we omitted to include a good book by Konhäuser, entitled "Die Krankheiten des Hundes und deren Behandlung," published in Vienna by Braumüller; also one by Müller, "Die Krankheiten des Hunden," published in Berlin in 1892.

Communications, Books, Journals, etc., Received.

COMMUNICATIONS have been received from J. B. Wolstenholme, Manchester; P. R. Gordon Brisbane, Queensland; D. Pallin, Lucknow; W. A. Hancock, Newcastle-on-Tyne; Messrs. Arnold & Sons, London; F. C. Mahon, London; A. W. Hill, London; F. W. Hall, Edinburgh.

BOOKS AND PAMPHLETS: *M. Dupont*, L'Age du Cheval et des Principaux Animaux Domestiques; Bulletin des Séances de la Société Nationale d'Agriculture de France; *M. Kauffmann*, Les Vipères de France; Procès-Verbal de l'Académie Royale de Belgique; *P. J. Cadiot*, La Tuberculose du Chien; Report of the Bombay Veterinary College for the year 1892-93; *C. Cornevin and F. X. Lesbre*, Traité de l'Age des Animaux Domestiques d'apres les Dents et les Productions Epidermique.

JOURNALS, ETC.: *Baily's Magazine; Echo Vétérinaire; Modern Medicine and Bacteriological World; Revue Veterinaire; Gaceta Médico-Veterinaria; Journal of the Royal Agricultural Society of England; Annales de Méd. Vétérinaire; Agricultural Journal of the Cape Colony; Lancet; Recueil de Med. Vétérinaire; Presse Vétérinaire; Clinica Veterinaria; Journal de Méd. Vétérinaire et de Zootechny; Edinburgh Medical Journal; Repertorium der Tierheilkunde; Mark Lane Express; British Medical Journal; Journal of Anatomy and Physiology; Le Progres Veterinaire; Live Stock Journal; American Veterinary Review; Journal of the United Service Institution; Thierarzt.*

NEWSPAPERS: *Madras Mail* (2 copies); *Hindu; Queensland Evening Observer; Madras Times; Scotsman; Yorkshire Herald; Western Mail.*